UNIVERSITY OF JAMMU

(NAAC ACCREDITED 'A ++' GRADE' UNIVERSITY)
Baba Sahib Ambedkar Road, Jammu-180006 (J&K)

Academic Section
Email: academicsectionju14@gmail.com

NOTIFICATION
(26/June/Adp./27)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Academic Council, is pleased to authorize the adoption of the syllabi and courses of study for **Four Year Innovate Under Graduate Programme (Design Your Degree)** of Semester I, II, III and IV **(as given in the annexure)** for the examinations to be held in the years as per details given below:-

Semester	**For the examinations to be held in the year**
Semester- I	December 2025, 2026 and 2027
Semester-II	May 2026, 2027 and 2028
Semester-III	December 2026, 2027 and 2028
Semester-IV	May 2027, 2028 and 2029

The Syllabi of the courses are also available on the University website: www.jammuuniversity.in

Sd/-
DEAN ACADEMIC AFFAIRS

No. F.Acd/II/26/3046-62
Dated: 19/06/2026

Copy to:

1. Director/Convener, Board of Studies in Design Your Degree
2. All members of the Board of Studies.
3. C.A. to the Controller of Examinations
4. Director, Computer Centre, University of Jammu
5. Joint Registrar/Deputy Registrar/Asst. Registrar (Conf. /Exams. UG)
6. Guard File

18/6/26
JOINT REGRISTRAR (ACADEMIC)

18/6 18/06/26

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester Ist

Course Code	Course Title	Credits	Contact Hours (per Credit)
UMDDDC-101	Understanding the World through Data Lens	04	15
UMDDDC -102	Mathematics Without Phobia	04	15
UMDDDC -103	IT in Everyday Life	04	15
UMDDDC -104	Expressing Creativity	03	15
UMDDDC -105	Exploring the Surroundings	03	15
UMDDDC -106	Life Skills	02	15

Prof. Alka Sharma
Director, SIIEDC

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: 1st

(For the Session Dec 2025, 2026, 2027)

Course Code: UMDDDC-101

Course Title: Understanding the World through Data Lens

Credits: 04

Contact Hours: 15 per credit

Maximum Marks: 100

Internal Evaluation: 30

External Evaluation: 70

Course Objective: Data is a powerful tool for describing the world around us. It allows us to see patterns and make predictions. For example, data can describe demographic information, geographic information, attributes of physical objects, events, how people use technology, social dynamics etc.

Course Outcomes:

- The students will be able to describe the real life problems through data;
- They will be able to analyze Data and make informed decisions.

Collection of data (primary/secondary), understanding Data through tables, diagrams with spreadsheets.

Making sense of Data, identifying the variables as quantitative or qualitative, understanding error, accuracy and approximation in the collected Data.

Interpretation of Data, locating the center, mode, median and mean and their calculations with spreadsheets. Percentiles, percentiles in spreadsheets, percent rank, skewness, variance and standard deviation and normal distribution.

Completing the picture through Data: Formulation of the problem statement and decision making

University of Jammu

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Course Title: Understanding the World through Data Lens

Credits: 04

Maximum Marks: 100

Contact Hours: 15 per credit

Internal Evaluation: 30

External Evaluation: 70

Activity: Data collection for:

- Demographic Information: age, interests, behaviors, social media activi- ties etc.
- Geographic Information: Population Density, Traffic Patterns, Public Trans- portation Usuage etc.
- Attributes of Physical Objects: Product Quality, Sales, Customer Feed- back etc.
- Events: Cases of Recent Epidemic (for example, COVID-19), Election Results etc.
- Actions: Player Performance Statistics

Pedagogy: The entire course is a kind of project work excepting a few lectures for introducing statistical concepts which the Mentor must introduce through Data collected from the real life situations in the city of Jammu itself. Different groups of Students be allotted different projects and be allowed to carry out the required task at their own except for general guidance/supervision.

Reference Book for self study:

- Shobha Bagai, Amber Habib and Geetha Venkataraman, *A Bridge to Math- ematics,* Sage Publications India PvtLtd., 2017.
- David Spiegelhalter (2019). The Art of Statistics Learning from Data, Penguin Books Australia.
- Scott E. Page (2018). The model thinker: what you need to know to make data work for you, Basic Books.
- Derek Rowntree (2018). Statistics without tears An Introduction for Non-Mathematician, Penguin.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

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Credits: 04

Contact Hours: 15 per credit

Maximum Marks: 100

Internal Evaluation: 30

External Evaluation: 70

Mode of Evaluation:

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The remaining 70% of the grade shall be assessed through a transdisciplinary major project, which will span an entire semester.

The evaluation of the major project would be comprehensive, considering various factors including the depth and accuracy of the project's content, the applied methodology, research rigor, the effective use of IT tools and data analysis, as well as the meaningful findings and practical implications derived from the project. The assessment shall also include testing innovativeness, communication and problem solving.

University of Jammu
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(Design Your Degree)

Semester: 1st
(For the Session Dec 2025, 2026, 2027)

Course Code: UMDDDC-102
Credits: 04
Contact Hours: 15 per credit

Course Title: Mathematics without Phobia
Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

Objectives: The course aims to construct a bridge to the subject by introducing the students to the language of Mathematics. It will help the students develop an understanding about the fundamental role of mathematics in society and develop critical thinking skill.

Course Outcomes:

- Increasing the appreciation of mathematics as an art and a human endeavor.
- Motivating the students to use mathematics by providing them basic tools.
- Evolving mathematical ability to handle real life problems

Critical Thinking and Problem Solving Skills

As we move towards a digitalized world, the societal problems are becoming more complex. Hence, there is a constant need to make decisions. This unit includes:

1. Inductive and deductive reasoning
2. Art of estimation
3. Solving a problem using Polya's Four steps: Understand the problem, Devise a plan, Use the plan to solve the problem, Look back and check the answer

Logic and Reasoning

In order to communicate effectively, make more convincing arguments and develop patterns of reasoning for decision making. Logic is used in the programming of modern devices such as cell phones and digital cameras. This unit shall discuss

1. Syllogistic arguments using Venn Diagrams
2. Understand Logical statement with the help of switching circuits

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Course Code: UMDDDC-102 | **Course Title: Mathematics without Phobia**
Credits: 04 | **Maximum Marks: 100**
Contact Hours: 15 per credit | **Internal Evaluation: 30**
External Evaluation: 70

Mathematics behind Scheduling and Path finding

In order to solve the problems of scheduling, this unit will help in understanding and solving the

1. Street Routing problems
2. Travelling salesman Problems
3. Scheduling Problems

Art of Encryption

Humans are now using online payment modes. The messages are being sent through electronic platform. In order to maintain privacy and security, the devices use encryption modes based on Mathematics. This unit will familiarize the students to

1. Different enumeration methods (number system in bases other than 10)
2. Modular Arithmetic
3. Prime numbers
4. Application of prime numbers in the RSA procedure

References:

i. Angel, A.R., Abbott, C.D. and Runde, C.D., A Survey of Mathematics with Applications, Pearson, 11th Ed, 2021.

ii. Blitzer, R., Thinking Mathematically, Pearson, 8th Ed, 2022.

iii. Bagai, S., Habib, A. and Venkataraman, G., A Bridge to Mathematics, Sage Publications India Pvt Ltd., 2017.

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Course Title: Mathematics without Phobia
Maximum Marks: 100
Internal Evaluation: 30
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iv. Tannenbaum, P., Excursions in Modern mathematics, Pearson, 10th Ed, 2021.

v. Michael D. Smith, Understanding Mathematics in the Digital Age, Winchelsea Press, 2018.

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University of Jammu

Four Year Innovative Undergraduate Program

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Semester: 1st

(For the Session Dec 2025, 2026, 2027)

Course Code: UMDDDC-103
Credits: 04
Contact Hours: 15 per credit

Course Title: IT in Everyday Life
Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

Course Objectives

1. To provide an understanding of the role and impact of information technology (IT) in everyday life
2. To familiarize students with commonly used IT tools and applications
3. To develop essential digital literacy skills for effective use of IT in personal and professional contexts
4. To enhance critical thinking and problem-solving abilities through practical IT exercises

Information Technology and the Communication Revolution

Overview of information technology. Communication prerequisites: Devices and services, Computers, Laptops, Smart phones, smart gadgets, internet, mobile and web applications. Communication channels: email, video conferencing tools, i.e., Zoom, Google Meet, Microsoft Teams, etc., social media platforms, i.e., Facebook, Twitter, LinkedIn etc., their responsible use for personal and professional networking, and their impact on society.

Activity:

a. Students may create accounts on different social media to create personal and professional
networks.

b. Students may appreciate the impact of these social media technologies in their overall growth. They may try to build up their professional network using these applications.

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Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

c. Students may identify the risks and safety measures to be followed while using social media application.

Resources:

"What is Information Technology?" by Simplilearn: https://www.youtube.com/watch?v=-FIWXeURBKs

"Introduction to Information Systems" by study.com https://www.youtube.com/watch?v=VDQsT6XdQyQ

"Social Media 101: Understanding the Basics" https://www.youtube.com/watch?v=3SuNx0UrnEo

"The Dark Side of Social Media" by Kurzgesagthttps://www.youtube.com/watch?v=d5GECUAdX_k

IT in smart banking and E-commerce:

Online/ net banking, mobile payments, UPIs, other financial transaction methods. Online shopping: e-commerce websites, i.e., GeM, Amazon, Flipkart, eBay, Myntra, etc., their working, customer and product management. Impact of smart banking and e-commerce on the lives of common people. Safety measures to following while doing online financial transactions.

Activity:

a. Students may explore different online payment methods and identify their pros and cons.

b. Students may select any e-commerce platform and analyze it's working.

University of Jammu

Four Year Innovative Undergraduate Program

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Course Title: IT in Everyday Life
Maximum Marks: 100
Internal Evaluation: 30
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Resources:

1. "What is E-commerce? A Beginner's Guide" by Shopify: https://www.youtube.com/watch?v=1hLbH3ZhzJE

2. Title: "How Online Shopping Works"by Techquickie: https://www.youtube.com/watch?v=vc9rYfOYjls

3. Title: "How to Stay Safe While Shopping Online"by TechGumbo: https://www.youtube.com/watch?v=EErkUk3fWYU

IT in entertainment and productivity

Entertainment: Streaming services, i.e., Netflix, YouTube, Hotstar, Amazon Prime, Spotify, etc. Gaming services, online and console gaming platforms, i.e., Dream11, Call of Duty, Clash of Clans, etc. Productivity tools: Search engines, i.e., google, bing, yahoo, etc. Navigation, i.e., GPS, GLONASS, NAVIC, etc.

Activity:

a. Students may identify different online entertainment service providing channels and discuss with each other about their mechanism of operating.

b. Any other activity based on the above topics.

Resources:

1. https://www.netflix.com/in/

2. https://www.youtube.com/

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3. https://www.amazon.in/amazonprime

4. https://www.google.co.in/webhp

5. https://en.wikipedia.org/wiki/Global_Positioning_System

Other useful and productive online services

Cloud storage: Google drive, Dropbox, iCloud, Microsoft Azure, AWS, IBM Watson, etc., facilities and benefits of cloud services. Online Learning Platforms: Coursera, Edx, Datacamp, Udemy, Khan Academy, etc. pros and cons of e-learning. Smart home devices/services: smart speakers, smart lighting, fans, security cameras, home automation.

Activity:

1. Appreciate the use and benefits of different cloud services.
2. Ask students to identify various e-learning platforms and explore free important courses on them.
3. Students may create a home automation application of their choice as assignment.

Resources:

1. https://en.wikipedia.org/wiki/Cloud_computing

2. https://www.learnworlds.com/online-learning-platforms/

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Internal Evaluation: 30
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3. https://azure.microsoft.com/en-in/

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Semester I[st]
(For the session Dec 2025, 2026 and 2027)

Course Code: UMDDDC-104
Credits: 03
Contact Hours: 15 per credit

Course Title: Expressing Creativity
Maximum Marks: 75
Internal Evaluation: 25
External Evaluation: 50

About the Course

The human mind is an amazing machine. However, unlike machines, it has the unique ability to create. We can see this amply demonstrated throughout history and across cultures. This course will help students to find out what creativity is, how this process works and its vital role in society and the advancement of civilization. Students will learn to express themselves using a variety of artistic and creative methods. They will be exposed to a variety of methods of expression like written, verbal, singing, dancing, painting, traditional art, photography and even playing instruments. They will create their own works of art drawing from their life experiences to express themselves.

Learning Objectives

- To develop and improve creative thinking
- To understand key components/concepts and approaches to creativity
- Develop interpersonal and vocal expression skills
- Develop writing skills
- Create original works of art using original ideas, drafts, and final creations
- Engage in analysis and reflection.

Fine arts and performance arts:

Music/VisualArt/Crafting/Writing/Photography/Drama/Movement/Choreography

Activity: Students are required to choose any one genre from the above and do one activity on that particular genre.

Audio Visual skills Graph:

Photography & video documentary/podcast/ vlogs.

Activity: Students are required to choose one of the above categories and make/create a sample as an expression of their creativity.

Writing Skills:

Articles/ blogs/ poetry/ script or content writing

University of Jammu
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Semester I[st]
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Course Code: UMDDDC-104
Credits: 03
Contact Hours: 15 per credit

Course Title: Expressing Creativity
Maximum Marks: 75
Internal Evaluation: 25
External Evaluation: 50

Activity: Choosing any form or category given above, demonstrate your writing abilities.

Oral communications:

Debate/ Declamation/ storytelling/ Extempore/ Recitation

Activity: Students are required to do any one activity on any of the above given genres.

Project:

1. Transforming: Mini TED Talk - Presentation and Review
2. Theatrical Drama: Conglomerating all types of creative skills learned.

Learning Outcomes:

After the completion of the course, the students will be able to

- Understand key components/concepts and approaches to creativity
- Develop interpersonal and expression skills
- Create original works of art using original ideas, drafts, and final creations
- Combine analytical insights with creative subjects
- Collaborate with teams of people from diverse backgrounds and disciplines.

Recommended readings

Amabile, T. (2012), "Componential theory of creativity", No. 12-096, Harvard Business School. http://www.hbs.edu/faculty/Publication%20Files/12-096.pdf

Bennick, G. (2009) We Want Something More. TEDx talk "Creativity and Transformation." https://www.youtube.com/watch? v=dnchjo8J8fg

Cropley, A. (2006), "In Praise of Convergent Thinking", *Creativity Research Journal*, Vol. 18/3, pp. 391-404.

Gajda, A., M. Karwowski and R. Beghetto (2017), "Creativity and academic achievement: A meta-analysis." *Journal of Educational Psychology,* Vol. 109/2, pp. 269-299. http://dx.doi.org/10.1037/edu0000133.

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Semester I[st]
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Credits: 03
Contact Hours: 15 per credit

Course Title: Expressing Creativity
Maximum Marks: 75
Internal Evaluation: 25
External Evaluation: 50

Guastello, S. (2009), "Creativity and personality", in Rickards, T., M. Runco and S. Moger (eds.), *The Routledge Companion to Creativity*, Routledge/Taylor & Francis, New York. http://psycnet.apa.org/record/2009-03983-022

Guilford, J. (1950), "Creativity", *American Psychologist*, Vol. 5/9, pp. 444-454, http://dx.doi.org/10.1037/h0063487.

Mode of Evaluation:

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University of Jammu

Four Year Innovative Undergraduate Program

(Design Your Degree)

Semester: 1st

(For the Session Dec 2025, 2026, 2027)

Course Code: UMDDDC-105 **Course Title: Exploring the Surroundings**

Credits: 03

Maximum Marks:75

Contact Hours: 15 per credit **Internal Evaluation: 25**

External Evaluation:50

Course Rationale

Explore Your Surroundings is a fully experiential, field-based course designed to sensitize first-semester undergraduate students to their immediate social, economic, environmental and cultural environment. The course aims to develop observation, inquiry, documentation and reflection skills by engaging students directly with their neighbourhood, community and local institutions. The course is entirely activity-oriented, with learning emerging from field visits, surveys, interactions and reflective practice rather than classroom lectures. It aligns strongly with NEP 2020 and the Design Your Degree philosophy of learning by doing.

Course Objectives

- To develop systematic observation and inquiry skills among students.
- To familiarize students with local community, economy, environment and history.
- To promote awareness of biodiversity, heritage conservation and sustainability.
- To encourage civic sense, cultural sensitivity and social responsibility.
- To build basic skills of data collection, documentation and reflection.

Course Outcomes (COs)

After completion of the course, students will be able to:

CO1: Observe and document social, economic, environmental and historical features of their surroundings.

CO2: Collect primary information through classroom-guided field visits and interactions.

CO3: Identify local issues related to livelihoods, environment, biodiversity and heritage.

CO4: Work collaboratively in classroom discussions and field-based activities.

CO5: Reflect on experiences and relate learning to responsible citizenship and everyday life.

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Credits: 03

Maximum Marks:75

Contact Hours: 15 per credit **Internal Evaluation: 25**

External Evaluation:50

Observing the Neighbourhood and Campus

Introduction to observation skills; discussion on surroundings, space, people and activities; demonstration of simple mapping and diary writing.

Field: Guided walk of campus and nearby neighbourhood; observation of land use, infrastructure and human activities; maintenance of structured observation diary and sketch maps.

Community, History, Culture and Local Institutions

Discussion on community structure, local history and cultural traditions; understanding evolution of settlements, institutions and social practices; introduction to ethics of field interaction and preparation of simple interview questions.

Field: Visit to local institutions (school, health centre, Panchayat/Municipal office, Anganwadi, NGO) and nearby historical or cultural sites; interaction with community members to understand historical background, cultural practices and institutional roles; documentation of institutional functions and challenges.

Local Economy, Occupations and Livelihoods

Introduction to local economy, occupations, formal and informal sectors; guidance on preparing livelihood profiles.

Field: Visit to markets, vendors, MSMEs or service providers; observation of working conditions, income activities and risks; preparation of a simple livelihood profile.

Environment and Biodiversity

Discussion on environment, sustainability and biodiversity; introduction to basic concepts of ecosystems, flora and fauna; importance of environmental conservation and responsible behaviour.

Field: Observation of waste management, water use, cleanliness, green spaces and local biodiversity (trees, plants, birds); identification of one local environmental issue and suggestion of basic awareness or improvement measures.

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Credits: 03

Contact Hours: 15 per credit

Maximum Marks:75
Internal Evaluation: 25
External Evaluation:50

Books

1. *A Life on Our Planet* – **David Attenborough**
   A personal witness statement on biodiversity loss and visions for the future — excellent for linking **global conservation with local field observations**.
2. *The Forest Unseen: A Year's Watch in Nature* – **David G. Haskell**
   A model for *close observation of nature* — great mindset for students doing field diaries.
3. *Discovering Biodiversity: An Educator's Guide* – **Emily Findlay et al.**
   Practical resource with activities on **biodiversity observation and local ecosystems**
4. *Development as Freedom* - **Amartya Sen**
   Introduces development, livelihoods and social justice in simple language.
5. *An Uncertain Glory* – **Jean Drèze & Amartya Sen**
   Helps students understand **inequality, welfare, health and education**.
6. *Poor Economics*– **Abhijit Banerjee & Esther Duflo**
   Excellent for understanding **ground-level economic realities**.

Documentaries / Films (Visual & Experiential)

1. *Our Planet* **(Netflix)**
   In-depth look at ecosystems and the impact of humans — helps students link local observations to **global environmental issues.**
2. *Extinction: The Facts* **(BBC, David Attenborough)**
   Powerful documentary on biodiversity loss, species extinction and climate change.
3. *The Green Planet* **(BBC/PBS)**
   Focuses on plant life and ecological interactions — useful for **biodiversity and environment units.**

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Maximum Marks:75

Contact Hours: 15 per credit **Internal Evaluation: 25**

External Evaluation:50

TED Talks & Online Talks (Short, Insightful)

1. **Julianna Santos:** ***Find Your Role in Wildlife Conservation*** — Encourages individuals to see their role in conserving ecosystems and biodiversity.
2. **Emma Marris:** ***Nature is Everywhere — We Just Need to Learn to See It*** — Helps students redefine "nature" in their surroundings (parks, streets, gardens).
3. **George Monbiot:** ***For More Wonder, Rewild the World*** — Inspires thinking about **rewilding and ecological restoration** even in local contexts.
4. **Watch TED Talks on Environment (Playlist)** — Collection of short talks on nature, sustainability and the environment.
5. **Hans Rosling –** ***The Best Stats You've Ever Seen***
   Helps students rethink poverty and development visually.
6. **Amartya Sen –** ***Why Inequality Matters*** (Talks & lectures)
7. **Esther Duflo –** ***Social Experiments to Fight Poverty***
8. **Chimamanda Ngozi Adichie –** ***The Danger of a Single Story***
   Excellent for community, culture and historical narratives.
9. **Shashi Tharoor –** ***India: Past, Present and Future*** (Talks & lectures)

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Course Code: UMDDDC-106
Credits: 02
Contact Hours: 15 per credit

Course Title: Life Skills
Maximum Marks: 50
Internal Evaluation: 15
External Evaluation: 35

Course Objectives:

1. To provide knowledge about new skills and an opportunity to apply these skills.

2. To help learners shape their attitudes and beliefs in a positive manner by making productive life choices, managing their well-being, and achieving personal success.

Course Outcomes:

By the end of the course, students will be able to:

1. Develop an understanding of themselves, including their emotions, thoughts, and behavior.
2. Establish healthy relationships skillfully with others through assertiveness and conflict resolution.
3. Exhibit effective decision making by using creative thinking and effective execution skills.

Self Awareness

1. Stress Management
2. Emotions & Feelings
3. Positive Thinking
4. Self Esteem

Activities and Assessment:

Conduct activities and role plays to provide hands-on learning experiences for stress management, emotional awareness, positive thinking, and enhancing self-esteem.

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Course Code: UMDDDC-106
Credits: 02
Contact Hours: 15 per credit

Course Title: Life Skills
Maximum Marks: 50
Internal Evaluation: 15
External Evaluation: 35

Resources:

How to Manage Stress: https://www.youtube.com/watch?v=HB1snh5ArVw by HealthyPlace.
The Power of Positive Thinking: https://www.youtube.com/watch?v=pPrEHa5K4AI by Brian Tracy
How to Build Self-Esteem: https://www.youtube.com/watch?v=MbF5dyU96CE by The School of Life
The Basic Emotions: What They Are and How They Work: https://www.youtube.com/watch?v=y0Ko3aWihGQ by Simply Psychology

Interpersonal Skills

1. Empathy
2. Listening Skills
3. Interpersonal Effectiveness
4. Handling Disputes
5. Managing Relationships
6. Confident Communication

Activities and Assessment:

1. Engage in activities, role plays, and discussions to develop and enhance empathy, active listening skills, interpersonal effectiveness, conflict resolution, relationship management, and confident communication.

Resources:

Empathetic Listening Skills: https://www.youtube.com/watch?v=lO1gpzakbik by Charisma On Command
How to Listen Actively: https://www.youtube.com/watch?v=SnCJIjOxbeY by Emerald Works

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: 1st

(For the Session Dec 2025, 2026, 2027)

Course Code: UMDDDC-106
Credits: 02
Contact Hours: 15 per credit

Course Title: Life Skills
Maximum Marks: 50
Internal Evaluation: 15
External Evaluation: 35

How to Handle Conflict Effectively:https://www.youtube.com/watch?v=jyFYcQkduco by Charisma on Command

How to Communicate with Confidence:https://www.youtube.com/watch?v=EBU8biGIbZU by Fast Track Your Career

Thinking Skills

1. Goal Setting (Setting SMART goals)
2. Decision Making
3. Problem Solving
4. Critical and Creative Thinking
5. Executive Functioning Skills
6. Resilience

Activities and Assessment:

1. Participate in activities, exercises, and discussions to develop and enhance goal-setting skills, decision-making abilities, problem-solving techniques, critical and creative thinking, executive functioning skills, and resilience.

Resources:

How to Set SMART Goals | Goal Setting for Students by Achieve Your Goals :https://www.youtube.com/watch?v=i0QfCZjASX8
Decision Making and Problem Solving:https://www.youtube.com/watch?v=vUSqnzieiY4 by Smarter Every Day
The 7 Steps of Problem Solving: https://www.youtube.com/watch?v=iQtnggDMfqE by Business Infographics
How to Make Better Decisions:https://www.youtube.com/watch?v=VPkj7BJ-noc by TED-Ed
Critical Thinking vs. Creative Thinking: https://www.youtube.com/watch?v=MDdK4diviSA by Chandler

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

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Course Title: Life Skills
Maximum Marks: 50
Internal Evaluation: 15
External Evaluation: 35

Bolt
How to Improve Your Critical Thinking Skills: https://www.youtube.com/watch?v=I50YRzeMzZwby Khan Academy
How to Build Resilience: 5 Practices That Work:https://www.youtube.com/watch?v=36terqkUD_c by Verywell Mind

Executive Function Skills are the Roots of Success | Stephanie Carlson | TEDxMinneapolis: https://www.youtube.com/watch?v=BvyTiC_byOo

Project:

Engage in a group project focused on addressing a real-life problem faced by people in a specific area or locality. The project will involve the following steps:

1. Identify a problem of relevance.
2. Build a perspective on the identified problem through research and analysis.
3. Discuss possible solutions and their implications.

Resources:

1. "Emotional Intelligence: Why It Can Matter More Than IQ" by Daniel Goleman
2. "The Power of Positive Thinking" by Norman Vincent Peale
3. "Mindset: The New Psychology of Success" by Carol S. Dweck
4. "Crucial Conversations: Tools for Talking When Stakes Are High" by Kerry Patterson, Joseph Grenny, Ron McMillan, and Al Switzler
5. "Decision Making for Dummies" by Dawna Jones
6. "Creative Confidence: Unleashing the Creative Potential Within Us All" by Tom Kelley and David Kelley
7. "The 7 Habits of Highly Effective People" by Stephen R. Covey

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: 1st

(For the Session Dec 2025, 2026, 2027)

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Contact Hours: 15 per credit

Course Title: Life Skills
Maximum Marks: 50
Internal Evaluation: 15
External Evaluation: 35

8. "Grit: The Power of Passion and Perseverance"

Mode of Evaluation:

The assessment structure for this program consists of two components: internal assessment and external assessment. The internal assessment, shall account for 20 marks of the total of 50 shall be on the basis of continuous performance monitoring through tests/ quizzes/ presentations/ class participation/ small live projects emphasizing on development of skills in application, effective communication, and teamwork.

The remaining 30 shall be assessed through a transdisciplinary major project, which will span an entire semester.

The evaluation of the major project would be comprehensive, considering various factors including the depth and accuracy of the project's content, the applied methodology, research rigor, the effective use of IT tools and data analysis, as well as the meaningful findings and practical implications derived from the project. The assessment shall also include testing innovativeness, communication and problem solving.

University of Jammu

Four Year Innovative Undergraduate Program

(Design Your Degree)

Semester 2nd

Course Code	Course Title	Credits	Contact Hours (per Credit)
UMDDDC -201	Problem Solving Through Generative AI	04	15
UMDDDC -202	World of Startups through Real Life Studies	04	15
UMDDDC -203	Decoding the world through AI	04	15
UMDDDC -204	Discovering the Self	03	15
UMDDDC -205	Art and Aesthetics of Designing	03	15
UMDDDC -206	Responsible Citizenship through Experimentation	02	15
UMDDDA -207	A language to Understand the Nature	04	15
UMDDDA -208	Understanding the World through Data Lens - II	04	15

Prof. Alka Sharma
Director, SIIEDC

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: 2nd

(For the Session May 2026, 2027 & 2028)

Course Code: UMDDDC-201

Course Title: Problem Solving Through Generative AI

Credits: 04

Contact Hours: 15 per credit

Maximum Marks: 100

Internal Evaluation: 30

External Evaluation: 70

Course Objectives

1. To introduce students to coding using GPT-4, a state-of-the-art language model.
2. To familiarize students with the principles and techniques of natural language processing and machine learning.
3. To provide hands-on experience in developing applications using GPT-4 and related tools.
4. To enable students to understand the ethical considerations and limitations of AI-powered coding.

Introduction to GPT-4 in Coding

Overview of GPT-4, its capabilities, and applications in coding, Prompt Engineering, Art of interacting with Generative AI models.

Activity:

a. Conduct a virtual workshop or presentation on GPT-4 using ChatGPT to simulate a live session.
b. Organize a coding competition where participants use ChatGPT to solve coding challenges.
c. Host a panel discussion with AI experts, employing ChatGPT for Q&A sessions and discussions.

Resources:

Use ChatGPT to generate summary scripts for relevant YouTube resources on GPT-4 features and applications.

Practical Applications of ChatGPT

Exploring diverse applications - Excel, content writing, image generation, etc.

Activity:

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: 2nd

(For the Session May 2026, 2027 & 2028)

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Course Title: Problem Solving Through Generative AI

Credits: 04

Maximum Marks: 100

Contact Hours: 15 per credit

Internal Evaluation: 30

External Evaluation: 70

a. **Excel Automation Workshop:** Use ChatGPT to guide participants in automating Excel tasks, such as data analysis, formula generation, and report creation.
b. **Content Writing Script:** Engage participants in a content writing script activity where they utilize ChatGPT to generate creative content, blog posts, or articles.
c. **Image Generation Experiment:** Explore image generation using ChatGPT. Participants can experiment with generating images or creative designs through textual prompts.

Resources:

Utilize ChatGPT to generate step-by-step guides and scripts for Excel automation, content writing, and image generation.

GPT-4 Architecture

Understanding the architecture and working of GPT-4.

Activity:

a. Conduct a technical presentation on GPT-4's architecture using ChatGPT to generate slides and visuals.
b. Organize a group project with ChatGPT-generated code snippets to implement a simplified version of GPT-4 architecture.
c. Facilitate a discussion on the limitations of GPT-4's architecture, using ChatGPT to explore potential improvements.

Resources:

Employ ChatGPT to create summary notes for technical videos explaining GPT-4 architecture.

Creative Content Generation

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

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Course Code: UMDDDC-201

Course Title: Problem Solving Through Generative AI

Credits: 04
Contact Hours: 15 per credit

Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

Generating diverse content types using ChatGPT - scripts, essays, letters, etc.

Activity:

- **Script Writing Challenge:** Participants use ChatGPT to write scripts for various scenarios, such as a dialogue between fictional characters or a short film script.
- **Essay Writing Session:** Engage in an essay writing session where participants utilize ChatGPT for generating content on specific topics.
- **Letter Writing Exercise:** Participants use ChatGPT to craft formal and informal letters for different purposes.

Resources:
Utilize ChatGPT to generate sample scripts, essay prompts, and letter templates for participants.

AI Ethics, Integration, and Future Trends

Leveraging GPT-4 for intelligent code completion and error correction.

Activity:

a. Conduct a demonstration session using ChatGPT to showcase GPT-4 in code completion and auto correction.
b. Organize a coding challenge where participants use ChatGPT to complete and correct code snippets.
c. Facilitate a discussion on the implications of relying on intelligent code completion and autocorrect tools, using ChatGPT to generate discussion points.

Resources:
Utilize ChatGPT to generate summaries for videos on AI Code Completion with GPT-4.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: 2nd
(For the Session May 2026, 2027 & 2028)

Course Code: UMDDDC-201

Course Title: Problem Solving Through Generative AI

Credits: 04

Contact Hours: 15 per credit

Maximum Marks: 100

Internal Evaluation: 30

External Evaluation: 70

Mode of Evaluation:

The assessment structure for this program consists of two components: internal assessment and external assessment. The internal assessment, shall account for 30% of the overall grade, on the basis of continuous performance monitoring through tests/ quizzes/ presentations/ class participation/ small live projects emphasizing on development of skills in application, effective communication, and teamwork.

The remaining 70% of the grade shall be assessed through a transdisciplinary major project, which will span an entire semester.

The evaluation of the major project would be comprehensive, considering various factors including the depth and accuracy of the project's content, the applied methodology, research rigor, the effective use of IT tools and data analysis, as well as the meaningful findings and practical implications derived from the project. The assessment shall also include testing innovativeness, communication and problem solving.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: 2nd
(For the Session May 2026, 2027 & 2028)

Course Code: UMDDDC-202

Course Title: World of Startups through Real Life Studies

Credits: 04
Contact Hours: 15 per credit

Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

Course Objectives

The objective of this course is to provide a comprehensive understanding of entrepreneurship and startups and also equip the students with the skills and knowledge needed to start and manage a successful business. The course balances theoretical concepts with practical applications to prepare students for the challenges and opportunities of entrepreneurship. At the end of the course the students will

- To inspire the learner to explore avenue for new venture creation or a startup
- To realize the challenges faced by entrepreneurs and how they overcome them to become successful
- Learn techniques for generating and evaluating innovative business ideas.
- Gain an understanding of legal and regulatory aspects related to starting a business.
- Learn about business structures, intellectual property, and compliance requirements.
- Explore different funding options for startups and understand how to pitch to investors and create a compelling business case.

Understanding the Startup Ecosystem

The Mindset of an Entrepreneur: Understand how an entrepreneur thinks, identifies opportunities, translate them into business value propositions, faces challenges, beats competition and creates a successful enterprise.

The Startup Ecosystem: Discuss the various elements that make up a startup ecosystem, including entrepreneurs, investors, support systems like incubators and accelerators, government policies, universities, and more.

Activity

- Each student will identify and meet a local successful entrepreneur and conduct an interview to understand how the entrepreneur has been able to successful build the enterprise. On the basis of the interview, discussion each student will write a short case study.
- Students in groups will identify various global, national and regional level institutions that provide support to entrepreneurs and promote entrepreneurship.

Resources

- Listen to the "Startup as a Career Option" TedTalk by Prof Dinesh Singh https://www.youtube.com/watch?v=5JfbT5mMFMI
- The Secret of How to Think Like an Entrepreneur | Amy Wilkinson | TEDxPaloAltoSalon https://www.youtube.com/watch?v=WAMwyAm0ySw

Generating Business Idea

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

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Course Title: World of Startups through Real Life Studies

Credits: 04
Contact Hours: 15 per credit

Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

Design Thinking Approach: Discuss the concept of design thinking and how this approach can be used to generate commercially viable ideas.

Idea Validation: Explain how to assess whether a business idea is viable. This could include strategies for conducting market research, creating a minimum viable product, and getting feedback from potential customers.

Business Models: Discuss different types of business models that startups can adopt and how they can be utilized for different sectors or industries.

Activity

- Students in groups will major trends / challenges / problems that are emerging in the society. Based on this, they will explore what are the existing products or service solutions available in the market to deal with such challenges? Are the customers / people in the society satisfied with them? Students are expected to use design thinking approach to propose possible innovative and creative solutions.

Resources

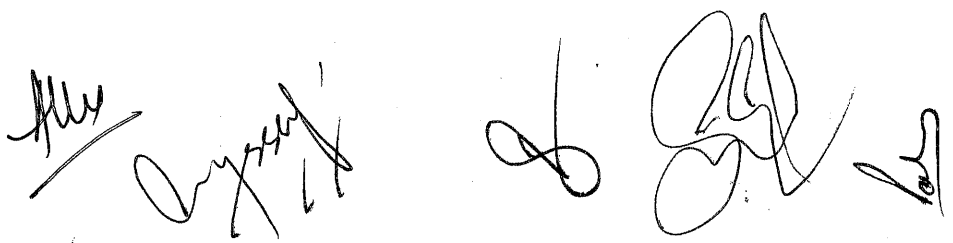
- Listen to the Creative thinking - how to get out of the box and generate ideas: Giovanni Corazza https://www.youtube.com/watch?v=bEusrD8g-dM
- Listen Clayton Christensen discussing Disruptive innovation https://www.youtube.com/watch?v=rpkoCZ4vBS1
- Listen to TedTalk on Speed up Innovation with Design Thinking | Guido Stompff https://www.youtube.com/watch?v=ZBxZC9l6xyk

Developing Business Plan

Business Plan: Discuss the relevance and importance of a comprehensive business plan. Also guide the students on the various components of a business plan. Contrast the business plan with detailed project report (DPR)
Pitch Deck: Understand the concept of pitching in entrepreneurship. Explain how students can develop interesting and effective pitch decks.
Entrepreneurial Finance: Discuss the concept of equity, debt, bootstrapping, valuation, stock markets

Activity

- Based on the major trends / challenges / problems that have been identified by the students and proposed solution, they will develop a business plan around the idea. Further they will be making a pitch deck in front of entrepreneurs and representative of financial institution.



University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: 2nd
(For the Session May 2026, 2027 & 2028)

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Credits: 04
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Course Title: World of Startups through Real Life Studies
Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

Resources

- Watch various episodes of Shark Tank India / Global and understand how start ups present their idea
- Read various scheme documents of banks, financial institutions and other government agencies that support or provide

Entrepreneurship and Society

Social Entrepreneurship: Discuss using case studies how entrepreneurship can solve social problems in the world. Elaborate on the concept of social entrepreneurship and its relevance in the emerging economies

Activity

- Each student will identify any one social enterprise and make a detailed report / presentation of the role of the selected enterprise in solving a social problem.

Resources

https://www.schwabfound.org/
https://www.ikeasocialentrepreneurship.org/
https://www.ashoka.org/en-in/focus/social-entrepreneurship

Pedagogy

The entire course is a kind of project work excepting a few lectures for introducing the concept of entrepreneurship which the Mentor must introduce through the real life case studies. Different groups of students be allotted different projects and be allowed to carry out the required task at their own except for general guidance/supervision.
Regular/periodic meetings and interaction with local/regional/national level entrepreneur shall be organized.

Reference Books / Resources

Text Books

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: 2nd
(For the Session May 2026, 2027 & 2028)

Course Code: UMDDDC-202

Course Title: World of Startups through Real Life Studies

Credits: 04
Contact Hours: 15 per credit

Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

1. Entrepreneurship: Successfully Launching New Ventures, 6/eby Bruce R. Barringer Pearson Education [ISBN- 9789353066499]
2. Entrepreneurship Development and Small Business Enterprises by Poornima M Charantimath, Pearson Education [ISBN- 9789353066260]
3. Entrepreneurial Thinking: Mindset in Action by Suzanne Mawson, Lucrezia Casulli; Sage
4. Global Entrepreneurship & Innovation by Sarika Pruthi, Jay Mitra; Sage
5. Design Thinking for Student Projects by Tony Morgan, Lena J. Jaspersen; Sage
6. Exploring Entrepreneurship by Richard Blundel, Nigel Lockett, Catherine Wang, Suzanne Mawson; Sage

International

1. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses, Eric Ries
2. "The $100 Startup" by Chris Guillebeau
3. The Founder's Dilemmas: Anticipating and Avoiding the Pitfalls That Can Sink a Startup by Noam Wasserman
4. Dear Female Founder: 66 Letters of Advice from Women Entrepreneurs Who Have Made $1 Billion in Revenue by Lu Li
5. Zero to One: Notes on Startups, or How to Build the Future , Peter Thiel and Blake Masters
6. The Innovator's Dilemma by Clayton Christensen
7. Start with Why: How Great Leaders Inspire Everyone to Take Action is a book by Simon Sinek
8. Hooked: How to Build Habit-Forming Products, Nir Eyal

National

1. Dream with Your Eyes Open: An Entrepreneurial Journey, Ronnie Screwvala, Rupa Publications
2. The Golden Tap: The Inside Story of Hyper-Funded Indian Startups, by Kashyap Deorah
3. Stay Hungry, Stay Foolish, Rashmi Bansal
4. Arise Awake: The Inspiring Stories Of 10 Young Entrepreneurs Who Graduated From College Into A Business Of Their Own, Rashmi Bansal, Bushfire Publishers
5. Doglapan: The Hard Truth about Life and Start-Ups, Ashneer Grover

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: 2nd
(For the Session May 2026, 2027 & 2028)

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Course Title: World of Startups through Real Life Studies
Maximum Marks: 100
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External Evaluation: 70

6. Big Billion Startup: The Untold Flipkart Story Mihir Dalal.
7. Dolphin and the Shark, The Lessons in: Stories on Entrepreneurship. by Namita Thapar
8. The Unusual Billionaires, Saurabh Mukherjea, Penguin Random House India

Magazines

- Entrepreneur India, Business India, Business Today, Outlook Business

Movies / Documentaries

Any of the below mentioned movies can be screened in the classroom and the students can be advised to discuss the key learning in the classroom

1. The Social Network
2. Steve Jobs
3. The Founder
4. The Startup Kids
5. The Pursuit of Happyness
6. Startup.com
7. WeWork: or The Making and Breaking of a $47 Billion Unicorn
8. Generation Startup
9. Becoming Warren Buffet
10. Indian Startup Stories [Amazon Prime]

YouTube Channels on Startups / Entrepreneurship

Any of the below mentioned movies can be screened in the classroom and the students can be advised to discuss the key learning in the classroom

- Your Story
- Shark Tank India / Global
- Y Combinator
- Raj Shamami

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: 2nd
(For the Session May 2026, 2027 & 2028)

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Credits: 04
Contact Hours: 15 per credit

Course Title: World of Startups through Real Life Studies
Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

- Harvard Innovation Labs

Mode of Evaluation

The assessment structure for this program consists of two components: internal assessment and external assessment. The internal assessment, shall account for 30% of the overall grade, on the basis of continuous performance monitoring through tests/ quizzes/ presentations/ class participation/ small live projects emphasizing on development of skills in application, effective communication, and teamwork.

The remaining 70% of the grade shall be assessed through a trans-disciplinary major project, which will span an entire semester.

The evaluation of the major project would be comprehensive, considering various factors including the depth and accuracy of the project's content, the applied methodology, research rigor, the effective use of IT tools and data analysis, as well as the meaningful findings and practical implications derived from the project. The assessment shall also include testing innovativeness, communication and problem solving.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: 2nd

(For the Session May 2026, 2027 & 2028)

Course Code: UMDDDC-203
Credits: 04
Contact Hours: 15 per credit

Course Title: Decoding the world through AI
Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

Course Objectives

- To provide an in-depth understanding of the concepts and applications of artificial intelligence (AI)
- To explore various AI techniques and algorithms
- To analyze the ethical and societal implications of AI
- To develop critical thinking and problem-solving skills in the context of AI

Foundations of AI

Introduction to Intelligence; Benchmarking of Intelligence; History and Significance of AI; Real world applications of AI; Goals, Challenges, and Applications of AI

Activity:

a. Conduct a presentation on the basics of AI.
b. Organize a group discussion on AI goals and applications.
c. Facilitate a panel discussion on the ethical considerations in AI.

Resources:

Crash Course, Simplilearn, edureka!, Intellipaat, CodeEmporium videos.

Machine Learning Fundamentals

Understanding Supervised, Unsupervised, and Reinforcement Learning, Introduction to Common ML Algorithms

Activity:

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: 2nd

(For the Session May 2026, 2027 & 2028)

Course Code: UMDDDC-203
Credits: 04
Contact Hours: 15 per credit

Course Title: Decoding the world through AI
Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

a. Workshop on ML fundamentals with hands-on activities.
b. Group discussion on practical ML applications.
c. Q&A session on strengths and limitations of ML algorithms.

Resources:

Andrew Ng, Simplilearn, Stat Quest, Microsoft Azure, Google Cloud videos.

Deep Learning and Neural Networks

Overview of Neural Networks and Deep Learning, Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs), Practical Applications in Computer Vision, NLP, and Speech Recognition

Activity:

a. Workshop on basics of deep learning with hands-on experience.
b. Hands-on activity with deep learning frameworks and tools.
c. Panel session on real-world applications of deep learning.

Resources:

- StatQuest, sentdex, 3Blue1Brown, Google Developers videos.

Tools and Technologies used in AI

Basics of programming languages for AI (Python, R), Introduction to libraries and frameworks (TensorFlow, PyTorch)
Data Preprocessing and Feature Engineering: Importance of quality data in AI, Data preprocessing techniques, Feature engineering and selection.
Model Training and Evaluation: Training and evaluating machine learning models, Hyperparameter tuning, Model performance metrics, Introduction to MATLAB.

Activity:

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: 2nd

(For the Session May 2026, 2027 & 2028)

Course Code: UMDDDC-203
Credits: 04
Contact Hours: 15 per credit

Course Title: Decoding the world through AI
Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

a. Workshop on basics of AI Tools and Technologies.
b. Group activity Training and evaluating machine learning models.
c. Panel session on challenges and potential of AI Tools & Technologies.

Resources:

- Stanford University, DeepMind, Sentdex, Code Bullet, CrashCourse AI videos.

AI Ethics, Integration, and Future Trends

Analyzing Ethical Considerations in AI, Integration of AI and Robotics, **Future Trends in AI:** Explainable AI, Generative AI, AI for Social Good

Activity:

a. Lecture on AI ethics and responsible AI.
b. Workshop on AI and Robotics integration.
c. Panel discussion on the future trends and challenges in AI.

Resources:

- The Royal Society, Stanford HAI, Intel, Boston Dynamics, Various TED Talks

Mode of Evaluation:

The assessment structure for this program consists of two components: internal assessment and external assessment. The internal assessment, shall account for 30% of the overall grade, on the basis of continuous performance monitoring through tests/ quizzes/

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: 2nd

(For the Session May 2026, 2027 & 2028)

Course Code: UMDDDC-203
Credits: 04
Contact Hours: 15 per credit

Course Title: Decoding the world through AI
Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

presentations/ class participation/ small live projects emphasizing on development of skills in application, effective communication, and teamwork.

The remaining 70% of the grade shall be assessed through a transdisciplinary major project, which will span an entire semester.

The evaluation of the major project would be comprehensive, considering various factors including the depth and accuracy of the project's content, the applied methodology, research rigor, the effective use of IT tools and data analysis, as well as the meaningful findings and practical implications derived from the project. The assessment shall also include testing innovativeness, communication and problem solving.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: II
(For the Session May 2026, 2027, 2028)

Course Code: UMDDDC-204 | **Course Title: Discovering the Self**
Credits: 03 | **Maximum Marks: 75**
Contact Hours: 15 per credit | **Internal Evaluation: 25**
External Evaluation:50

Course Objectives:

This learning programme is designed to enable the students to delve within their inner self to discover the drumbeat of their soul. The meaning of the phrase 'drumbeat of the soul' is best exemplified by illustrative examples of the lives of notable individuals. The intention of this learning programme is to use the lives and examples of such individuals to help the students to grasp the concept of 'drumbeat of the soul.' Once that concept is somewhat understood to a reasonable extent, then the students are expected to examine their own existence and seek indicators that shall point towards what may appear to be the drumbeat of their soul. It is not the intention of this learning programme to get the students to discover their drumbeat; rather the programme is designed to enable the student to realise the following:

1. What are the drumbeats of the souls of some notable individuals?
2. What were methods and tools that helped each one of these individuals to realise their individual drumbeats?
3. Encourage the student to take advantage of the paths these individuals followed and the methods they employed to realise their individual drumbeats to help the students to understand theirown drumbeat.
4. The student must learn from the lives of the individuals in the list of illustrative examples that this is not a simple or easy task nor is it one that happens in a flash. Rather, this is a lifelong quest.

Learning Outcomes:

It shall be repeatedly emphasized to the learner-by the mentor-that there is no single unique or standard path to achieve this understanding of the student's drumbeat. Different students may quite likely attempt to find their individual paths and are likely to use methods that are special or peculiar to their own quests on this journey. However, it shall be expected that the students shall realize from a study of the notable and illustrative examples that there are some features common to the list of examples. These common features shall include but not be limited to the following:

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: II
(For the Session May 2026, 2027, 2028)

Course Code: UMDDDC-204 | **Course Title: Discovering the Self**
Credits: 03 | **Maximum Marks: 75**
Contact Hours: 15 per credit | **Internal Evaluation: 25**
External Evaluation:50

A. An enormous appetite for hard work.

B. Adherence to discipline and balance in their daily lives.

C. Eagerness to learn and engage with the real world.

D. Abundant curiosity.

E. Ability to persist.

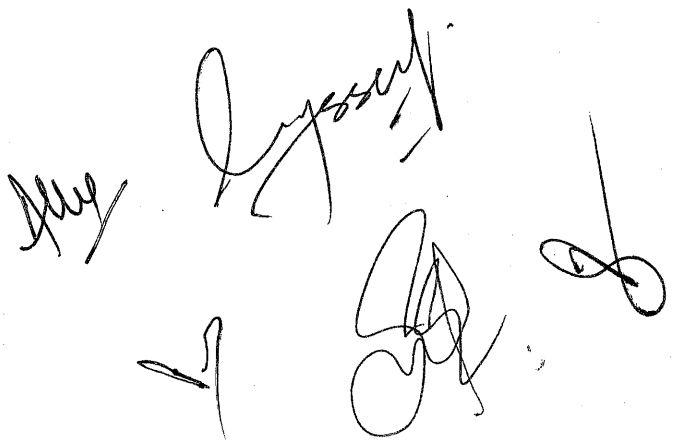
F. Display of fortitude, determination and even courage.

G. Ability to be good communicators.

Pedagogy:

The pedagogy for this learning program shall be in complete harmony with the pedagogy as prescribed for the entire Design Your Degree program. Hence, the students shall be learning significantly in a project mode. This shall involve forming groups of students. Each group shall take up a study of one or two notable individuals. Different groups shall study different individuals. The first questshall be to try and become familiar with the main aspects of their lives. They shall try and ask questions- within their groups-as to what made these individuals such determined and disciplined personalities. Discussions, readings and research must focus on identifying the drumbeats of each one of the notable individuals. The thrust or focus shall be on trying to figure out how and what enabled these individuals to discover the drumbeats of the souls.
The following is a list of some notable individuals:

1. Michael Faraday
2. Abraham Lincoln
3. Srinivasa Ramanujan
4. C. V. Raman
5. Mohammed Ali
6. Sachin Tendulkar
7. Isaac Newton



University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: II
(For the Session May 2026, 2027, 2028)

Course Code: UMDDDC-204 **Course Title: Discovering the Self**
Credits: 03 **Maximum Marks: 75**
Contact Hours: 15 per credit **Internal Evaluation: 25**
External Evaluation:50

8. Milkha Singh
9. Mahatma Gandhi
10. Arthur Ashe
11. Usain Bolt
12. Pele
13. Major Dhyan Chand
14. Louis Pasteur
15. Albert Einstein

Mode of Evaluation:

The assessment structure for this program consists of two components: internal assessment and external assessment. The internal assessment, shall account for 30% of the overall grade, on the basis of continuous performance monitoring through tests/ quizzes/presentations/class participation/small live projects emphasizing on development of skills in application, effective communication, and teamwork. The remaining 70% of the grade shall be assessed through a transdisciplinary major project, which will span an entire semester.

The evaluation of the major project would be comprehensive, considering various factors including the depth and accuracy of the project's content, the applied methodology, research rigor, the effective use of IT tools and data analysis, as well as the meaningful findings and practical implications derived from the project. The assessment shall also include testing innovativeness, communication and problem solving.

The projects will involve, but not be limited to, discussing the lives and achievements of notable individuals within their respective groups. Additionally, students will be encouraged to identify other individuals who possess similar qualities, no matter how modest they may be. Subsequently, students will engage in frank and modest discussions about their own qualities and characteristics in the context of both the notable individuals and those identified through personal experiences. The aim is to prompt each student to, in a sense, be on the lookout for external stimuli from the world around them that can awaken or stir their own inner "drumbeat." For instance, consider two groups, Group X and Group Y, each comprising 6 or 7 students. Group X may be assigned Mahatma Gandhi, while Group Y is assigned Muhammad Ali. Students in Group X will be expected to conduct research and engage in internal discussions to explore Gandhi's "drumbeat," his journey of discovery, and how he adhered to it. Similarly, Group Y will undertake the same exploration for Muhammad Ali.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

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It is anticipated that during inter-group discussions, students will observe that Ali and Gandhi were very unlike each other. Ali engaged in a sport that involved physically harming his opponents, whereas Gandhi advocated love for one's opponents. However, students will also be expected to uncover several common features between them. For example, Gandhi became an adherent of truth after witnessing the play "Satyavadi Raja Harishchandra," while Ali took up boxing after watching boxers on a TV show. Additionally, despite their differences, students are also expected to discover striking commonalities between Ali and Gandhi. For instance, Ali displayed great courage as a boxer, while Gandhi displayed great courage in his personal life when he assisted victims of the plague in South Africa.

The project will progress along these lines, and eventually, students will also search for similar stories and individuals in their own personal lives or through personal discovery. The mentor must skillfully guide the students to ask themselves questions about whether there are any external stimuli, like those experienced by Ali and Gandhi, that have stirred something within them. This will make them aware of the possibility of dormant "drumbeats" within themselves.

Suggested Readings:

Arsenault, Raymond. *Arthur Ashe: A Life*. Simon & Schuster, 2018.

Basu, Tejan Kumar. *A Complete Biography of C.V. Raman*. Prabhat Prakashan, 2021.

Blomfield, Vishvapani. *Gautama Buddha: The Life and Teachings of the Awakened One*. Quercus, 2012.

Bolt, Usain. *Faster than Lightning: My Story*. Harpercollins, 2015.

Calaprice, Alice, and Trevor Lipscombe. *Albert Einstein: A Biography*. Jaico Publishing House, 2012.

Casey, Peter. *The Story of Tata: 1868 to 2021*. Penguin Books, 2021.

Chand, Dyan. *Goal: An Autobiography*. The Hindu Group. 2018.

Charnwood, Lord. *A Complete Biography of Abraham Lincoln.* Vayu Education of India, 2019.

Crawley, Sara, Lara Foley, and Constance Shehan. "Creating a World of Dichotomy: Categorizing Sex and Gendering Cultural Messages." *Race, Gender, Sexuality, and Social Class*, Edited by Susan J Ferguson, Sage Publications Inc., 2015, pp. 31-43.

Desai, Mahadev Haribhai. *Mahatma Gandhi: An Autobiography: The Story of My Experiments WithTruth*. Fingerprint Publishing, 2009.

Fischer, Louis. *The Life of Mahatma Gandhi*. Harpercollins, 2006.

Gandhi , Mahatma. *The Story of My Experiments with Truth*. Fingerprint, 2009.

Gandhi, A. K. *Ratan Tata: A Complete Biography*. PrabhatPrakashan, 2021.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: II
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Course Code: UMDDDC-204 **Course Title: Discovering the Self**
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Gandhi, Mohandas Karamchand. *Hind Swaraj or Indian Home Rule*. Pilgrims Publishing, 2013.

Hauser, Thomas. *Muhammad Ali: His Life and Times*. Simon & Schuster, 1992.
Hirshfeld, Alan. *The Electric Life of Michael Faraday*. Walker Books, 2006.
History, Hourley. *Michael Faraday: A Life from Beginning to End*. Createspace Independent PublishingPlatform, 2017.
---. *Issac Newton: A Life from Beginning to End.* Independently Published, 2017.
Jablonski, Carla. *The Story of Abraham Lincoln: A Biography Book for New Readers*. Rockridge Press,2020.
Kalam, A. P. J. Abdul. *Ignited Minds: Unleashing the Power Within India*. Penguin Books India, 2002.
Kalam, A. P. J. Abdul, and Arun Tiwari. *Wings of Fire: An Autobiography*. Universities Press, 2022.
Keim, Albert. *Louis Pasteur: A Biography*. CreateSpace Independent Publishing Platform, 2015.
Kepler, Johannes, and Carola Baumgardt. *Johannes Kepler: Life and Letters.* Philosophical Library, 1951.
Khalid, Haroon. *Walking with Nanak*. Vintage Books, 2022.
Lachowicz-Tabaczek K., and J. Śniecińska. "Self-concept and Self-esteem: How the Content of the Self- concept reveals Sources and Functions of Self-esteem." *Polish Psychological Bulletin*, vol. 42, no. 1, 2011, pp. 24-35.
Mehra, Rakeysh Omprakash. *Milkha Singh - An Autobiography - The Race of My Life*. Rupa, 2013.
Mitra S., S. Basu, and N. Sanyal. "Unraveling the Roots of Personality Disorganization through
Nandini. *Biography of Har Gobind Khorana: A Nobel Laureate's Inspiring Story*. Prabhat Prakashan, 2021.
Parameswaran, Uma. *C. V. Raman: A Biography*. Penguin India, 2010.
Pele. *Pele: The Autobiography*. Simon & Schuster, 2007.
Prabhudesai, Devendra. *Hero: A Biography of Sachin Ramesh Tendulkar*. Rupa Publications, 2017.
Robins R. W., and L. A. Pervin. editors. *Handbook of Personality: Theory and Research.* Guilford Press, 2008.
Singh, Ritu. *NR Narayana Murthy: A Biography*. Rajpal Publishing, 2018.
Teja, S Krishna and Sai Srinivasa. *Ramanujan Biography*. Notion Press, 2022.

Tesser, A., Felson, Richard B. Felson , and Jerry M. Suls. *Psychological Perspectives on Self and Identity.*American Psychological Association, 2000.
Thapar, Sewaram Singh. A *Critical Study of the Life and Teachings of Sri Guru Nanak Dev: The*

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

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Founder ofSikhism. White Falcon Publishing, 1999.

Suggested Videos:
https://www.youtube.com/watch?v=0h5mr6LpyCs
https://www.youtube.com/watch?v=L80_q2tPveo
https://www.youtube.com/watch?v=hpZwCRInrgo
https://www.youtube.com/watch?v=ZWK-e80ae9Y
https://www.youtube.com/watch?v=OETtNQ7-who
https://www.youtube.com/watch?v=QEXcE67xMxA
https://www.youtube.com/watch?v=MKGHC00732A
https://www.youtube.com/watch?v=B37MXvsB_Vc
https://www.youtube.com/watch?v=Vc7_VyVXDLs
https://www.youtube.com/watch?v=7FvrgW7wOY8
https://www.youtube.com/watch?v=7-ZbWV61uMs
https://www.youtube.com/watch?v=kHgsOppb1WM
https://www.youtube.com/watch?v=np7fbR13n-E

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: 2nd

(For the Session May 2026, 2027, 2028)

Course Code: UMDDDC-205 **Course Title: Art and Aesthetics of Designing**

Credits: 03 **Maximum Marks: 75**

Contact Hours: 15 hours per credit **Internal Evaluation:25**

External Evaluation:50

Course Objectives

1. Introduction to the World of designs
2. Provide the opportunity to the students to develop understanding about how the designs are created
3. Initiate an attitude of playfulness to aid design thinking
4. How they can develop effective solutions for designing

Outcomes:

1. Students will be able to investigate and think creatively about design problems and opportunities
2. Students will be able to develop visual literacy and will be able to articulate design problems

Designing and Types of designs

Where do we find designs (Natural/Artificial/Random/Manmade), SMART Designs (Functional, and Efficient)

Activity: Effective Gallery walk and Role Plays

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Resources

https://www.wonderopolis.org/wonder/is-design-a-science-or-an-art/

designshttps://www.designmattersmedia.com/podcast/2013/sheila-bridges

How To Think Like A Great Graphic Designer. New York: Allworth Press. 2007. ISBN 9781581156355. OCLC 181142646.

The Essential Principles of Graphic Design. Cincinnati, Ohio: How Books. 2008. ISBN 9781600610479. OCLC 176923189.

De Bono, E. (1985) Six Thinking Hats: An Essential Approach to Business Management. Little, Brown, & Company (Ed) Penguin Life

https://gutschow.wordpress.com/ Kai Notes on Architect

Biological Designs

Complexity of cells of human and plant: Discussion on design of DNA, Designs of human body cells, cell of ostrich, Amoeba (Design and Functionality),

Workout the structural complexity of plants, emphazing the intricate organization and functionality of flowers. Consider the specialized adaptations and diverse morphological features that contribute to reproductive success and ecological significance of slower within the plant kingdom

Designs and patterns of stars and galaxies (listing of galaxies, new galaxies, functionality of design)

Activity: Crazy 8s exercise and Story Board/Telling

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

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Contact Hours: 15 hours per credit **Internal Evaluation:25**

External Evaluation:50

Resources:

youtube: The Art and Science of Design | Frank Stephenson | TEDxEton

BIODESIGN : Nature, Science and Creativity, William Myers, 2018, Museum of Modern Art (MoMA) in New York and Thames & Hudson More at www.biology-design.com

Biology in the Grid: Graphic Design and the Envisioning of Life (Posthumanities Book 46) Kindle Edition

Biologically Inspired Design: Computational Methods And Tools, Springer London Ltd, ISBN: 9781447152477

Gomez-Palacio, Bryony, and Armin Vit. *Women of design: influence and inspiration from the original trailblazers to the new groundbreakers*., p. 175–177, How Books, 2008, ISBN 978-1600610851

De Bono, E. (2016), Lateral Thinking, Penguin Life, ISBN-9780241257548

Kahneman, Daniel, (2015), Thinking, Fast and Slow. New York Penguin Books Ltd, ISBN-13: 978-0141033570, ISBN-10: 0141033576

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

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External Evaluation: 50

Varieties of Architectural designs , Cities which are SMART across the World: Well acquainted with functionality, Structure and functions of ancient designs across the World , Discussion on the Architectural Works (India and abroad) and Understanding architects of simple Machines

Activity: Reflection exercise, Mind Mapping, Listing and functionality of designs of ancient structures, Videos of Jopseph Allen Stein (American Architect) on his works in India),

Resources:

https://archestudy.com/climatologically-sound-building-the-indian-habitat-centre/

https://www.re-thinkingthefuture.com/case-studies/a3516-india-international-centre-or-iic-by-joseph-allen-stein-a-structure-of-three/

Weinstein, Dave (2007), "Architectural idealist: Modernist Joseph Allen Stein preferred to design public housing and finished his career in India", San Francisco Chronicle.

White, Stephen (1993), Building in the Garden: The Architecture of Joseph Allen Stein in India and California, Oxford University Press, ISBN 0-19-562924-8

White, Stephen (1993), Oxford University Press. The architecture of Joseph Allen Stein in India and California, by

The responsibility for environment: First address, 9 October 1962, by Joseph Allen Stein. University of California, College of Environmental Design, 1962

Applications of designs

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

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Contact Hours: 15 hours per credit **Internal Evaluation:25**

External Evaluation:50

Application of Design Thinking to solve the design problems in everyday life

Projects

1. Designing a school library
2. Improving public transport
3. Designing sustainable packaging solutions
4. Enhancing remote learning

Activity: Developing physical model of designs, 3D models of design and Journey Map

Resources:

Soni,P.,(2020), Design your thinking, Penguin Random House India Portfolio, ISBN: 9780670094097

Towards a New Architecture (Vers une Architecture) LE CORBUSIER, Dover Publications, New York, 1986, 1927, English; originally published 1923 in French, ISBN: 9780486250236

Alexandra Lange (2022), Meet Me by the Fountain: An Inside History of the Mall Hardcover, Bloomsbury Publishing, ISBN 978-1635576023

Pedagogy: The entire course is a kind of project work which will be pre reads, discussions activities and explorations of designs from the surroundings and then from the other parts of the country followed by the designs across the world. Few lectures by the Mentor on how to understand the art and science of designing, which

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(Design Your Degree)

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External Evaluation:50

aspects must be taken and deliberated while studying comparing and developing the various designs. Mentor will provoke students to think innovatively about the naturally existing designs their purpose behind the designs of the nature.
Different groups of students will be allotted different projects and to be carried out that will require different task at their own like field visits and explorations from the surrounding as well through online mode along with general guidance/supervision

Mode of Evaluation:

The assessment structure for this program consists of two components: internal assessment and external assessment. The internal assessment, shall account for 30% of the overall grade, on the basis of continuous performance monitoring through tests/ quizzes/ presentations/ class participation/ small live projects emphasizing on development of skills in application, effective communication, and teamwork.

The remaining 70% of the grade shall be accessed through a transdisciplinary major project, which will span an entire semester.

The evaluation of the major project would be comprehensive, considering various factors including the depth and accuracy of the project's content, the applied methodology, research rigor, the effective use of IT tools and data analysis, as well as the meaningful findings and practical implications derived from the project. The assessment shall also include testing innovativeness, communication and problem solving.

UNIVERSITY OF JAMMU

Four Year Innovative Undergraduate Program
(Design Your Degree)

Semster-2nd
(Session May 2026, 2027 & 2028)

Course Code: UMDDDC-206
Credits: 02
Contact Hours: 15 per Credit

Course Title: Responsible Citizenship through Experimentation

Maximum Marks: 50
Internal Evaluation: 15
External Evaluation: 35

About the Course:

Citizenship education is essential for preparing young students for our shared democratic life. It is about enabling the people to make their own decisions and to take the responsibilities for their own lives and their communities. Experimenting citizenship is essentially a skill the college students should equipped with and they need to have a reasonable understanding of the political, social , economic and civic functions of our society. Citizenship is more than a subject as if tailored in local context, its skills and values will enhance democratic life for all of us. The concept of citizenship is centered to the issues of self, empathy, assumption, stereotypes, discrimination, prejudices, conflict and peace building, innovation, continuous learning etc . The pedagogy shall largely be experiential and shall consist of team exercises, group learning, community actions, discussions, group activities, cases studies, simulation exercises, field trip, report writing and report presentations.

Learning Objectives:

The objective s of the course is to provide the **knowledge and understanding** of the various concept like citizenship, democracy, rule of law, human rights diversity, multiculturalism , justice, equality sustainable development global community etc.

To equip the students with the **skills and aptitudes** so as to take decision on the basis of critical thinking, expressing opinions, taking part in discussions and debates, negotiation and taking part in the community action.

UNIVERSITY OF JAMMU

Four Year Innovative Undergraduate Program
(Design Your Degree)

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Course Title: Responsible Citizenship through Experimentation

Maximum Marks: 50
Internal Evaluation: 15
External Evaluation: 35

To equip the students with the values wherein he/she respect and understand the idea of justice, rule of law, tolerance, courage to defend his/her point of view and work with and stand up for others.

Students will be able to identify ripple effects of human movements across the globe and how they impact holistic human ecologies.

Students will be able to give voice to their local narratives and develop an ability to step into self-authorship.

Students will be able to recognize and discuss their personal and social identities, as well as gain an understanding of their sense of self-efficacy within a community justice framework.

Students will learn to translate their knowledge and wisdom to actionable practice within their communities.

Course Outcome:

It will help the students to learn the **concept in detail** and various **relationships with** survival, growth of democracies and a healthy vibrant society.

It enables the students to make the **positive contribution** by developing the expertise to claim their rights and understand their responsibilities in the evolving world.

It shall enable the students with a **voice** in his/her college life, in their communities and societies at large.

It shall further enable them to be **informed, articulate and responsible** in their respective communities.

UNIVERSITY OF JAMMU

Four Year Innovative Undergraduate Program
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Module-A: Making sense of citizenship

- **Activities:** Today, on the way to campus (asking the students what they have experienced, witnessed, heard or read in the context of citizenship e.g., a biker jumping the signal, the heap of garbage on wayside, heard/read that people helping the police to figure out the possible narcotics spots in the area, traffic jam etc)

  Pedagogy: Discussion/ interaction on the issues raised in the activity, possible agreeable position (constitutional/ sustainable /culturally acceptable plans by the students for the issues raised).

  Learning outcomes: student shall be able to contextualize the issue with the concept under discussion and further be able to have comprehensive knowledge and also be able to make a reasonable plan to address the issue raised.

Module-B: Practising Citizenship

Activities: Doable action plan in the immediate vicinity (shall be finalized with the discussion/ input of the students)

Pedagogy: making teams/action plan/ reaching to a agreeable action plan/ action spreadsheet/execution of the plan.

Learning outcome: learning leadership, team building, responsibilities to immediate surrounding/community, how to make local sustainable and acceptable plan.

Module-A: Digital citizenship

UNIVERSITY OF JAMMU
Four Year Innovative Undergraduate Program
(Design Your Degree)

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Maximum Marks: 50
Internal Evaluation: 15
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Activities: to asking students what bad/unpleasant they received /heard of other/sent on social media platform. How they categorize (acceptable/ unacceptable content, who defines, cultural sensitivity, laws associated with etc.

Pedagogy: discussion on issues/concerns /event raised by the students shall be followed by the presentation (individual /group) about the various laws about usage of digital space.

Simulation exercise on the limitations, sensitivities (cultural/religious/identity/nationalism etc.), usage and misusage of digital platform.

Learning outcomes: student shall be able to inculcate mutual respect, inclusivity, cultural sensitivities etc.

Module-B: Multi-culturism, Global citizenship

- **Activities**: 1-pin-baloon (prejudice), exercise -2: explain individual in the picture (stereotype), new girls in the class (discrimination). Discussions, cases studies-(macro & micro level).

  Pedagogy: The group can have interaction/ discussion with diverse set of people (other region /culture/religion/ethnic background etc.) and the same shall be followed by presentation (individual/group)

  Learning outcome: students shall be able to acquire better life skills/ career skills /understanding sensitivities of other/respecting others.

UNIVERSITY OF JAMMU

Four Year Innovative Undergraduate Program
(Design Your Degree)

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Maximum Marks: 50
Internal Evaluation: 15
External Evaluation: 35

References &resources:

https://ncert.nic.in/textbook/pdf/lepy102.pdf

https://www.hoddereducation.com/media/resources/he/Citizenship/MRN%20AQA%20GCSE%20(9-1)%20Citizenship/MRN%20AQA%20GCSE%20Citizenship%20skills.pdf

https://practice-school.eu/activity5-conflict-solution-peace-making-and-peacekeeping-activities/

https://ncert.nic.in/textbook/pdf/lepy102.pdf

Guiding classroom discussions for democratic citizenship education, https://www.tandfonline.com/doi/full/10.1080/03055698.2017.1373629

Lifelong citizenship, https://brill.com/display/book/9789463512398/BP000007.xml

Mode of Evaluation:

The assessment structure for this program consists of two components: internal assessment and external assessment. The internal assessment, shall account for 30% of the overall grade, whereas the external shall be of 70%. The evaluation shall be based shall be of Participation in the discussion/interaction, their reflections, individual assignments/ presentations /group presentations, project participation and its completion.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: II
(For the Session May 2026, 2027 & 2028)

Course Code: UMDDDA-207
Credits: 04
Contact Hours: 15 per credit

Course Title: A Language to Understand the Nature

Maximum Marks: 100
Internal Evaluation: 30
External Evaluation:70

Objectives: The objective of the course on "A Language to Understand the Nature" include:

Developing linguistic skills to describe and analyze natural phenomena;
Developing the ability to apply Calculus techniques to solve problems in various fields including mathematics, science, engineering, and social sciences;
Developing critical thinking and problem-solving skills through challenging Calculus problems and applications;
Preparing for further study in mathematics, science, engineering and related areas.

Contents of the Course

A. Real Numbers

Review of Sets, relations and functions;
Real numbers: Real numbers as natural extension of rational numbers, the set of real numbers as field, the least upper bound property of real numbers;
sequences of real numbers: Introducing the idea of limit, sequence of real numbers and its convergence, monotonic sequences, Cauchy sequence, some useful limits;
Series of real numbers: Convergence of the series, necessary and sufficient condition for convergence, comparison test, D'Alembert's ratio test, Caucy's root test, idea of absolute convergence.

B. Differentiation and Interaction

Continuity: Limit of a function, elementary properties of limits, some useful limits, Continuous function, algebra of continuous functions, intermediate value theorem, Fixed-point theorem, exponentials and logarithms, Heine-Borel theorem, Uniformly continuous functions;
Differentiability: Introduction of differentiation as the rate of change and steepness of a curve, properties of differentiable functions, Chain rule, Rolle's theorem, Mean-Value theorem, Leibnitz's theorem, Taylor's theorem, Introduction of Maxima and Minima through real world examples;
Riemann Integration: Introduction of Riemann integration as area under a curve, upper and lower Riemann integrals, necessary and sufficient condition for a function to be Riemann integrable, continuity and integration, fundamental theorem of calculus.

C. Differential equations

Differential equations: Introduction of differential equation through real world problems;
First-order linear differential equation with examples like (a) Modelling how a person learns, (b) Law of heating and cooling,
(c) Parabola, (d) The hanging cable; Bernoulli's equation;

University of Jammu
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Course Title: A Language to Understand the Nature

Maximum Marks: 100
Internal Evaluation: 30
External Evaluation:70

Introduction of partial derivatives, Exact differential equation;Existence and uniqueness of solution;
Second-order differential equations and their examples like Hooke'slaw, Simple pendulum, L-C-R electrical circuit, Kepler's laws etc.

D. Vectors

Vectors: Vectors in the plane, Cartesian coordinates and vectors in space, dot and cross product of vectors, lines and planes in space;
Matrices: Algebra of matrices, types of matrices, determinantof square matrices, the adjoint of a square matrix, the inverseof a matrix, Cramer's rule;
Linear mappings: Linear mappings on R^2, algebra of linear trans- formations on R^2, linear transformations and matrices, linear transformations and geometry.

Activity: Examples and exercises based on each of the topics of allthe four topics shall be done through class discussions, tutorials, seminars etc. Different Minor and Major projects to be given to different groups of the class besides regular involvement in problems solving sessions/class seminars.

Pedagogy: Mentor must introduce each topic with the help of real life situations/problems so as to give complete understanding of the concept and enabling the students to find solutions to the problems attheir own by "How to Solve it" approach. Mathematical concepts mustcome to the students in a natural way instead of imposing on them.

Reference Books for self study:

(1) Sinha, K.B., Karandikar, R.L., Musili, C., Pattanayak, S., Singh,D., and Dey, A., Understanding Mathematics, Universities Press(India) Pvt. Ltd. Hyderabad, India, 2000.
(2) Gregson, K., Understanding Mathematics, Nottingham Univer- sity Press, Nottingham, UK, 2007.
(3) Acheson, D., The Calculus Story, A Mathematical Adventure, Oxford University Press, UK, 2017.
(4) Thomas, G.B. and Finney, R.L.,Calculus and Analytic Geome-try, Pearson Education in South Asia, 2006.

Mode of Evaluation:

The assessment structure for this program consists of two components: internal assessment and external assessment. The internal assessment, shall account for 30% of the overall grade, on the basis of continuous performance monitoring through tests/ quizzes/ presentations/ class participation/ minor projects emphasizing on development of problem solving skills and applications of calculus to other disciplines.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

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Course Title: A Language to Understand the Nature

Maximum Marks: 100
Internal Evaluation: 30
External Evaluation:70

The remaining 70% of the grade shall be assessed through a transdisciplinary major project with an emphasis on applications of calculus to real world problems. This project will span over the entire semester.

The evaluation of the major project would be comprehensive, considering various factors including the depth and accuracy of the project's content, the applied methodology, research rigor, the effective use of IT tools and data analysis, as well as the meaningful findings and practical implications derived from the project. The assessment shall also include testing innovativeness, communication and problem solving.

University of Jammu

Four Year Innovative Undergraduate Program

(Design Your Degree)

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(For the Session May 2026, 2027 & 2028)

Course Code: UMDDDA-208

Course Title: Understanding the World through Data Lens - II

Credits: 04

Contact Hours: 15 per credit

Maximum Marks: 100

Internal Evaluation: 30

External Evaluation: 70

Course Objectives

1. To make you to understand the appropriate application of various statistical tools, procedures and tests.
2. Enable you to make informed decisions based on data with sophisticated statistical tools.
3. To teach you the uses, capabilities and limitations of various statistical procedures
4. To facilitate you in interpreting and reporting the results

Core Learning Outcomes

Probability and Distribution

Probability, Conditional Probability, Bayes Probabilities, Some discrete and Continuous Probability Distributions, Sampling Distributions

Activity:

a) Conduct probability experiments in the classroom using coins, dice and playing cards.
b) Group activity on case studies

Introduction of Estimation and Statistical Inference

Point and interval estimation of population parameters, design of hypothesis, errors in inference, the reasoning of significance tests stating the hypothesis.

Activity:

a) Demonstrate a learning sessions to develop hypothesis through different applications.
b) Host a panel discussion between different groups in different disciplines.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester: II
(For the Session May 2026, 2027 & 2028)

Course Code: UMDDDA-208

Course Title: Understanding the World through Data Lens - II

Credits: 04
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Tests of Significance

Creating and calculating the value of a test statistics, finding the p-value, Making Decision, Interpretation and conclusion followed by recommendations, small and large sample tests, ANOVA, Chi-square test.

Activity:

a) Conduct demonstration sessions using SPSS to analyze data sets.
b) Organize a group project to inferential analysis of case study through SPSS
c) Critical Group discussion on the report of group project.

Bivariate and Multivariate Analysis

Simple and multiple linear regressions, assumptions, method of estimation, Inference, Testing, Interpretation and applications, Discriminant Analysis, Logistic Regression Analysis, Factor Analysis

Activity:

a) Appropriate numerical case study will be given to the students to analyze.
b) Practical problems solving in and outside class through assignments.
c) Analyze real world scenarios and determine the appropriate type of analytical techniques to utilize.
d) Interpret and communicate the results of statistical analysis generated by SPSS or EXCEL.

Essential Textbooks

1. Jim Frost (2020): Introduction to Statistics: An Intuitive Guide for Analyzing Data and Unlocking Discoveries, published by Statistics By Jim Publishing.
2. David Spiegelhalter (2019): The Art of Statistics: How to learn from Data, published by Basic Books, First Edition.
3. Albert Rutherford (2023): Statistics for the Rest of Us: Mastering the Art of Understanding Data Without Math Skills (Advanced Thinking Skills), published by

University of Jammu

Four Year Innovative Undergraduate Program

(Design Your Degree)

Semester: II

(For the Session May 2026, 2027 & 2028)

Course Code: UMDDDA-208

Course Title: Understanding the World through Data Lens - II

Credits: 04

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Independently Published.

4. Albert Rutherford (2022): The Art of Statistical Thinking: Detect Misinformation, Understand the World Deeper, and Make Better Decisions. (Advanced Thinking Skills), published by Independently published.

Mode of Evaluation:

The assessment structure for this program consists of two components: internal assessment and external assessment. The internal assessment, shall account for 30% of the overall grade, on the basis of continuous performance monitoring through tests/ quizzes/ presentations/ class participation/ minor projects emphasizing on development of problem solving skills and applications of analytical tools to other disciplines.

The remaining 70% of the grade shall be assessed through a transdisciplinary major project with an emphasis on applications of analytical tools to real world problems. This project will span over the entire semester.

The evaluation of the major project would be comprehensive, considering various factors including the depth and accuracy of the project's content, the applied methodology, research rigor, the effective use of IT tools and data analysis, as well as the meaningful findings and practical implications derived from the project. The assessment shall also include testing innovativeness, communication and problem solving

University of Jammu

Four Year Innovative Undergraduate Program

(Design Your Degree)

Semester 3RD

Course Code	Title	Credits	Contact Hours (per Credit)
UMDDDC-301	Does the World Revolve Around Economics	04	15
UMDDDC-302	Social Innovations	04	15
UMDDDC-303	Art and Science of Communication	04	15
UMDDDC -304	Understanding the Challenges of Climate Change	04	15
UMDDDC -305	Technologies of the Future	04	15
UMDDDA -307	The Art of Mathematical Modelling	04	15

Prof. Alka Sharma
Director, SIIEDC

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester III
(For the session Dec-2026, 2027 & 2028)

Course Code: UMDDDC-301

Credits: 04
Contact Hours: 15 per credit

Course Title: Does the world revolve around Economics
Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

Course Objectives

"This course explores the central question: 'Does the world revolve around economics?' by examining the pervasive influence of economic principles on global events, policies, and everyday life." It seeks to uncover the pervasive influence of economic principles and dynamics on the functioning of societies, institutions, and individuals worldwide. Grounded in interdisciplinary perspectives and empirical analysis, this course examines the multifaceted relationships between economics and various aspects of human existence, from global governance to individual decision-making. Through a combination of theoretical inquiry, case studies, and experiential learning, students will gain a deep understanding of how economic forces shape and are shaped by social, political, and cultural factors, illuminating the intricate web of interdependencies that underpin the world's economic landscape.The major focus of the course is to delve into following questions and statements:

1. Wars have profound and multifaceted impacts on economies, influencing everything from immediate financial markets to long-term development trajectories. They lead to the loss of human capital, reduced productivity, and setbacks in education and healthcare.
2. How interruption of trade due to wars can lead to shortages of goods, increase prices, and disruption of global supply chains, affecting economies worldwide?
3. What is the process of economy recovery and reconstruction?
4. **Does political power drive economic change, or does economic power drive political change?**
5. **How do economic policies affect political stability and vice versa?**
6. What is the role of incentives, information asymmetry, and socio-economic factors in decision-making of individuals.
7. How people make decisions under stress and uncertainty, providing insights into how fear, urgency, and survival instincts shape economic choices.

Learning Outcome

Studying the economic impacts of wars through the lens of real time case studies students will get a comprehensive understanding of both macroeconomic and microeconomic dynamics in times of conflict. At macro level, students will grasp how wars necessitate significant resource reallocation, leading to the opportunity costs of foregone investments in other sectors such as healthcare, education, and infrastructure. Through experiential comparison, students will identify how different political and economic ideologies are applied in real-world organizational

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester III
(For the session Dec-2026, 2027 & 2028)

Course Code: UMDDDC-301

Credits: 04
Contact Hours: 15 per credit

Course Title: Does the world revolve around Economics
Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

structures. At micro level, students will be able to **explore how local economies are influenced by and contribute to broader economic trends. They will be able to comprehend** the role of incentives, information asymmetry, and socio-economic factors in decision-making at individual level. Thereby gaining insight into the influence of individual and collective behavior, particularly in the context of scarcity and survival. Throughout the semester, through experiential learning, by demystifying economic principles and applying them to real-world scenarios, the students shall empower to think critically, question conventional wisdom, and uncover the hidden truths that shape our society. Thus, they may be able to apply economic reasoning to real-world scenarios.

Course Content

I. Wars and its profound and multifaceted impacts on economies, affecting everything from immediate financial markets to long-term development trajectories.Comprehensive understanding of the critical role of economic policies in both preventing conflicts and facilitating post-war recovery

1. The Syrian Civil War and destruction of infrastructure
2. Mongol's Invasion and its impact.
3. The ongoing conflict in Ukraine and disruption of the export of grain, causing global food supply issues and price increases.
4. The economic impacts of the Vietnam War continue to influence Vietnam's economic policies and development strategies.
5. Post-war Iraq and its impact on its foreign investment
6. Post-World War II reconstruction in Europe, supported by the Marshall Plan, led to significant economic recovery and growth.

Activities

1. Provide students with real-time data on global food prices before and after the Ukraine conflict. Students analyze the data to understand the economic impact on global markets and make predictions about future trends.
2. Students create an interactive digital map that visually represents the economic impacts of different wars (including those in your assignments). The map should include data points, images, and brief analyses of each conflict.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester III
(For the session Dec-2026, 2027 & 2028)

Course Code: UMDDDC-301

Course Title: Does the world revolve around Economics

Credits: 04
Contact Hours: 15 per credit

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3. Students participate in a role-playing simulation where they take on the roles of different stakeholders during the Mongol Invasion (e.g., local rulers, traders, Mongol leaders). They must navigate the immediate economic devastation and plan for the future.
4. Students may work in teams to develop a comprehensive reconstruction plan for a hypothetical war-torn country. The plan should include infrastructure rebuilding, economic policy reforms, foreign investment strategies, and social stability measures.

Books for reference

1. The Economics of Warby Paul Poast
2. War and the Economy in the Twentieth Century by Alan S. Milward
3. War and Peace: Essays on the Relationships between War and the Military Establishment by Michael Howard (Editor)
4. The Economic Consequences of the Peace by John Maynard Keynes
5. The Oxford Handbook of War by Julian Lindley-French and Yves Boyer (Editors)
6. Syria: The Making and Unmaking of a Refuge State by Dawn Chatty
7. Postwar: A History of Europe Since 1945by Tony Judt
8. The Great War and the Origins of Modern Financeby Marc Flandreau
9. Man, the State, and War: A Theoretical Analysisby Kenneth N. Waltz
10. War and Change in World Politics by Robert Gilpin
11. Vietnam's Economic Entities in Transition edited by Akira Suehiro and Tran Van Tho.
12. Vietnam's Economic Miracle: Policy Reforms and Economic Growth" by Adam Fforde and Stefan de Vylder

Documentaries

1. The Fog of War
2. For Sama
3. Restrepo
4. Trade Disruptions and War
5. Beyond Borders: The Debate Over Humanitarian Intervention (2000)
6. The War After the War (1998)
7. The Marshall Plan: Against the Odds (1997)
8. Hearts and Minds
9. The Vietman War

II. To Understand how political and economic factors intersect in real-world governance.
Investigation of different political ideologies that shape economic policies:

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester III
(For the session Dec-2026, 2027 & 2028)

Course Code: UMDDDC-301

Course Title: Does the world revolve around Economics

Credits: 04
Contact Hours: 15 per credit

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1. **Capitalism: The market-driven approach where private ownership and profit motive dominate, and the role of the state is debated between laissez-faire and interventionist models.**
2. **Socialism: A system in which the state or community plays a significant role in controlling resources and distributing wealth.**
3. **Mixed Economies: How most modern nations implement a blend of capitalist and socialist elements.**

Activities

1. **Students shall conduct interviews with workers or managers at both locations to understand the differences in decision-making, profit distribution, and worker involvement in governance. They present their findings, comparing the capitalist and cooperative models.**
2. Visit to a local government or policy-making institution (e.g., city council, central bank, or government economic advisory office) to observe how economic policies are debated and shaped by political considerations.

Books

1. **"The Wealth of Nations"** by Adam Smith
2. **Economic Development by Higgins**
3. **Capital in the Twenty-First Century"** by Thomas Piketty
4. **The Road to Serfdom"** by Friedrich Hayek

Documentary

1. **The Corporation"** (2003)
2. **"Inside Job"** (2010)
3. **Capitalism: A Love Story"** (2009)

III. Uncovering surprising truths about:

The economics of human behavior, particularly regarding the role of incentives whether monetary rewards, recognition, or social approval influences the decisions making more than just financial motivations and the role played by it in shaping behaviors and choices. Uncovering the role of information in decision-making, market efficiency, and policy effectiveness.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester III
(For the session Dec-2026, 2027 & 2028)

Course Code: UMDDDC-301

Course Title: Does the world revolve around Economics

Credits: 04
Contact Hours: 15 per credit

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Activities

1. Write a final reflection paper on what you have learned about the hidden side of economics and how it applies to your daily life.
2. Using data analysis tools to interpret economic data; identify trends and different causal relationships.
3. In small groups, students design a policy that uses specific incentives (monetary or non-monetary) to achieve a social or economic goal (e.g., reducing carbon emissions, increasing savings rates). They must consider how different incentives will influence behavior and the potential outcomes.

Books

1. **The Undercover Economist by Tim Harford**
2. Feakonomics by Steven D. Levitt and Stephen J. Dubner (Primary Text)
3. Super Freakonomics by Steven D. Levitt and Stephen J. Dubner

Documentaries

1. The Economics of Happiness (2011)
2. Freakonomics: The Movie"
3. The Big Short
4. Inside Job
5. TED Talks by Steven Levitt, Dan Ariely, and Richard Thaler

IV. Economics extends beyond finances and markets; it delves into human behavior and societal dynamics, revealing unexpected insights about how people and society functions.

1. Causation and correlation between various socio-economic and cultural aspects
2. Complex interplay of socio-economic factors in understanding various societal issues and providing an economical solution to it.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester III
(For the session Dec-2026, 2027 & 2028)

Course Code: UMDDDC-301

Credits: 04
Contact Hours: 15 per credit

Course Title: Does the world revolve around Economics
Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

Activities

1. Students will design and conduct interviews and surveys to gather primary data on economic behaviors and social norms. This could involve looking at how people make decisions in local markets, manage household finances, or engage in informal economies.

2. Students choose a public space (e.g., a park, coffee shop, or campus) to observe and analyze social interactions through an economic lens. They can focus on how individuals negotiate, cooperate, or compete in social settings.

3. Organize a debate where students explore the intersection of economics and social justice. They can argue for or against specific policies (e.g., universal basic income, minimum wage laws) and their impact on societal dynamics and human behavior.3

Books for reference

1. Freakonomics by Steven D. Levitt and Stephen J. Dubner (Primary Text)
2. Super Freakonomics by Steven D. Levitt and Stephen J. Dubner
3. Thinking, Fast and Slow by Daniel Kahneman
4. Predictably Irrational by Dan Ariely
5. Nudge by Richard H. Thaler and Cass R. Sunstein

Documentaries

1. Freakonomics: The Movie"
2. The Big Short
3. Inside Job
4. TED Talks by Steven Levitt, Dan Ariely, and Richard Thaler

Pedagogical Approaches:

The pedagogy of this course is entirely in align with the pedagogy prescribed for the Design Your Degree program. The course design incorporates a variety of interactive activities, practical exercises, and real-world experiences to facilitate holistic learning and skill development. The prime emphasis shall be on active participation and hands-on experiences, which are highly effective in understanding complex issues like the economic impacts of war.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester III
(For the session Dec-2026, 2027 & 2028)

Course Code: UMDDDC-301

Course Title: Does the world revolve around Economics

Credits: 04
Contact Hours: 15 per credit
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Internal Evaluation: 30
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Accordingly small groups shall be formed to discuss case studies of different wars and their economic impacts. Each group presents their findings.

Mode of Evaluation

The assessment structure for this program consists of two components: internal assessment and external assessment. The internal assessment, shall account for 30 per cent of the overall grade, on the basis of continuous performance monitoring through minor projects, group discussions, presentations/tests/quizzes, class participation, team work and 70% of the grade shall be assessed through a Major Project, which will span an entire semester. The evaluation of the major project would be comprehensive, considering various factors like identification of problem, methodology applied, tools used, data analysis and practical implication of the project. The project may involve choosing a specific war/local issue and conduct a detailed analysis of its long-term economic impacts, presenting their findings in a comprehensive research paper and oral presentation.

Internal Evaluation shall be based on

1. Participation in Discussions and Activities
2. Weekly Assignments and Reflections
3. Minor Projects and Presentations

External Evaluation shall be based on

1. Major Project and Final Presentation:

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester III
(For the session Dec-2026, 2027 & 2028)

Course Code: UMDDDC-302
Credits: 04
Contact Hours: 15 per credit

Course Title: Social Innovations
Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

Course Objectives

According to the Center for Social Innovation at the Stanford, Graduate School of Business, social innovation is defined as *"A novel solution to a social problem that is more effective, efficient, sustainable, or just than existing solutions and for which the value created accrues primarily to society as a whole rather than private individuals."* Social innovation is vital for creating sustainable, inclusive, and effective solutions to the complex challenges facing society today. It not only addresses immediate issues but also contributes to long-term systemic change, enhancing the overall well-being of individuals and communities.

This course explores the concept of social innovation, focusing on how novel solutions can address pressing social challenges. At the end of the course, students will

- Understand the community problems, social and economical change.
- Identify new and unaddressed social needs.
- Understand social innovation concepts and approaches.
- Analysis of social innovation disclosures in different sectors.
- Design innovative solutions with social impact through application of new models of leadership, collective intelligence and creativity techniques.

Students are expected to develop the following skills / competencies

- *Visionary* – Articulate the vision for self and society and believe that they can play a role in making the world a better place
- *Change Maker* – Understand the problem from someone else's perspective and solve problems by identifying new ideas
- *Collaborator* – Cultivate and nurture networks by working in teams and show empathy while interacting with others
- *Courageous Leader* – Think critically and be willing to navigate success and failure by working persistently over time
- *Community Orientation* – Feel respect for the community and appreciate the impact of diversity in the society

Understand the Social Context

Students (in groups of 4-5) will immerse themselves in a social context (preferably a rural setting) wherein they will be undertaking the following activities.

- Stay / Visit a village / town (other than their hown-town) for atleast one week
- Interact with various stakeholders within the community and understand the social context
- Identify various issues / challenges / problems / opportunities in the social context
- Undertake social , economic, resource and livelihood mapping of the village

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester III
(For the session Dec-2026, 2027 & 2028)

Course Code: UMDDDC-302
Credits: 04
Contact Hours: 15 per credit

Course Title: Social Innovations
Maximum Marks: 100
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- Assess the infrastructure (education, agriculture, health, community and related) available in the area
- Identify various institutions (government / non-government / community driven) working in the area.
- Evaluate the role of various government schemes in the development of the community and the area
- Assess the cultural and historical aspect of the area

Based on this, students will identify the social problem

Identify the Social Problem

The team is expected to conduct a thorough research to understand the problems which exist in the community and which the team want to address. The team will engage with the community members and other stakeholders to gain insights and understand the community's needs and perspectives.

To frame the social problem effectively, students can refer to the following theories of social innovation - Structural Functionalism; Conflict Theory; Symbolic Interactionism; Social Constructionism; Systems Theory; Feminist Theory; Critical Race Theory; Rational Choice Theory; Human Capital Theory; Ecological Systems Theory; Strain Theory; Social Learning Theory; Labeling Theory

Case Studies on Social Innovation

Students will go through the successful social innovation case studies and understand the social impact it has created. List of indicative case studies are

- Grameen Bank [https://grameenbank.org.bd/]
- BRAC [https://www.brac.net/]
- Aravind Eye Care System [https://aravind.org/]
- Ashoka [https://www.ashoka.org/]
- SELCO India [https://selco-india.com/]
- Jaipur Foot [https://www.jaipurfoot.org/]
- Barefoot College [https://www.barefootcollegetilonia.org/]
- Goonj [https://goonj.org/]
- Teach for India [https://www.teachforindia.org/]

Innovate for Social Problem

Based on the social problem identified in Unit 1 & 2, students will work on possible innovative solution. Students will be exposed to various models of social innovation - Social Enterprises, Open Innovation, Crowd sourcing and Crowd funding, Living Labs, Microfinance, Social Franchising. The relative merits and demerits of each of these models will be discussed.

List of Books / Readings

-
- Frontiers in Social Innovation: The Essential Handbook for Creating, Deploying, and Sustaining Creative Solutions to Systemic Problems (2022)

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester III
(For the session Dec-2026, 2027 & 2028)

Course Code: UMDDDC-302
Credits: 04
Contact Hours: 15 per credit

Course Title: Social Innovations
Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

- The Neutrality Trap: Disrupting and Connecting for Social Change by Bernard Mayer and Jacqueline N. Font-Guzmán
- Yes to the City: Millennials and the Fight for Affordable Housing by Max Holleran, reviewed by Asher Kohn
- Another World Is Possible: How to Reignite Social and Political Imagination by Geoff Mulgan
- The Voltage Effect: How to Make Good Ideas Great and Great Ideas Scale by John A. List
- The New Reason to Work: How to Build a Career That Will Change the World by Roshan Paul & Ilaina Rabbat
- Social Innovation: Comparative Perspectives (Routledge Studies in Social Enterprise & Social Innovation) by Helmut Anheier, Gorgi Krlev, Georg Mildenberger.
- Systems Thinking For Social Change: A Practical Guide to Solving Complex Problems, Avoiding Unintended Consequences, and Achieving Lasting Results by David Peter Stroh
- The Social Labs Revolution: A New Approach to Solving our Most Complex Challenges by Zaid Hassan
- Crutchfield, Leslie and Heather McLeod Grant. 2008. *Forces for Good: The Six Practices of High-Impact Nonprofits.* Jossey-Bass.
- Gladwell, Malcolm. 2000. *The Tipping Point*. Little Brown: Boston.
- Goldsmith, Stephen. 2010. *The Power of Social Innovation: How Civic Entrepreneurs Ignite Community Networks for Good.* Jossey-Bass.
- Laura Michelini, 2012, *Social Innovation and New Business Models: Creating Shared Value in Low-Income Markets*, Springer.
- Carlo Petrini, *Terra Madre: Forging a New Global Network of Sustainable Food Communities*, Chelsea Green.

Mode of Evaluation

The assessment structure for this program consists of two components: internal assessment and external assessment. The internal assessment, shall account for 30 per cent of the overall grade, on the basis of continuous performance monitoring through minor projects, group discussions, presentations/tests/quizzes, class participation, team work and 70% of the grade shall be assessed through a Major Project, which will span an entire semester. The evaluation of the major project would be comprehensive, considering various factors like identification of problem, methodology applied, tools used, data analysis and practical implication of the project.The project may involve choosing a specific war/local issue and conduct a detailed analysis of its long-term economic impacts, presenting their findings in a comprehensive research paper and oral presentation.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester III
(For the Session Dec-2026, 2027 & 2028)

Course Code: UMDDDC-303

Course Title: Art and Science of Communication

Credits: 04
Contact Hours: 15 hours per credit

Maximum Marks: 100
Internal Evaluation:30
External Evaluation:70

Course Objectives

- Understand the fundamental theories and principles of communication.
- Analyze the role of communication in different contexts (interpersonal, group, organizational, intercultural).
- Develop practical skills in public speaking, writing, and digital media
- Explore the impact of technology and media on communication practices

Outcomes:

1. Students will be able to critically evaluate the effectiveness of different communication strategies
2. Students will be able to analyze the role of communication in different contexts (interpersonal, group, organizational, intercultural)

Communication among Living organisms and Verbal and Non Verbal Communication

History of communication, Communication Strategies of various Live Plants and Animals, Amoeba communication, Child Communication

Elements of verbal communication: Language, Effective speaking and listening skills, Barriers to effective communication. Types of non-verbal communication:., Role of non-verbal cues in communication, Cultural variations in non-verbal communicatio

Activity:

- **Videos on -Plants, Sparrow, Fox communication**
- **Book The sectret life of Plants 1973 by Jagdish Bose**

- Role-playing exercise where students communicate specific messages using only non-verbal cues
- functional Speaking skills,
- Reflect on the activity and discuss the challenges and insights gained.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester III
(For the Session Dec-2026, 2027 & 2028)

Course Code: UMDDDC-303

Course Title: Art and Science of Communication

Credits: 04
Contact Hours: 15 hours per credit

Maximum Marks: 100
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- Observe a public place (e.g., park, café) and write a report on the non-verbal communication observe
- **Visuals without sound and effect**
- **Dumsharts**

Resources

csumb.edu/hr/employee-development/pearls-of-wisdom/verbal-non verbalcommunication/#:~:text=Verbal%20communication%20involv es%20using%20words,use%20to%20communicate%20without%20w ords
https://study.com/learn/lesson/verbal-nonverbal
Body Language: How to Read Others' Thoughts by Their Gestures Allan Pease, John Chandler
Nonverbal Communication: Studies and Applications Nina-Jo Moore, Mark Hickson III, Don W. Stacks

Interpersonal Communication & Group Communication

Dynamics of interpersonal relationships, Self-concept and self-disclosure, Conflict resolution and negotiation, Characteristics of small group communication, Roles and responsibilities in group settings, Decision-making and problem-solving in groups

Activity:

- Story telling
- using boards for expressing stories,
- making and editing videos
- Improving interpersonal communication and active listening skill

Resources
The Lost Art of Listening: How Learning to Listen Can Improve Relationships Michael P. Nichols
Humble Inquiry: The Gentle Art of Asking Instead of Telling Edgar H. Schein
https://www.commonsense.org/education/articles media-literacy-resources-for-classroom

Media and Technology in Communication, its differences and importance, Evolution of

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester III
(For the Session Dec-2026, 2027 & 2028)

Course Code: UMDDDC-303

Course Title: Art and Science of Communication

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communication technologies, Impact of social media and digital platforms, Ethical issues in digital communication, Basics of visual design and graphic communication, Role of visuals in enhancing messages, Analyzing visual media and advertisements

Activity:

- Integrate social media,
- **Make a commercial:** Making a video of a commercial,
- **Writing Skills**

Integrating technology to enhance learning

- **Learning Management Systems (LMS)**: Use platforms like Blackboard, Moodle, or Canvas for resources and assignments.
- **Online Discussion Forums**: Promote online discussions to extend learning outside the classroom.
- **Video Conferencing Tools**: Utilize tools like Zoom or Microsoft Teams for virtual presentations and guest lectures.

Resources:

https://www.goguardian.com/blog/9-unique-ways-to-use-technology-in-the-classroom

https://asiasociety.org/education/five-ways-use-technology-and-digital-media-global-learning

Public Speaking and Case Studies and Applications

Origin of public speaking, Preparing and organizing speeches, Techniques for effective delivery, Handling public speaking anxiety, Case studies on successful and failed communication strategies, Application of communication theories to real-world, Group presentations on case study analyses

Style of Communication: Limcoln, Martin lurther SSpeech Civil rights Movements
Was Gandhi a good communicator

Activity: Discussion and Public Speaking by using the following aspects

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester III
(For the Session Dec-2026, 2027 & 2028)

Course Code: UMDDDC-303

Course Title: Art and Science of Communication

Credits: 04
Contact Hours: 15 hours per credit

Maximum Marks: 100
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- **Diverse Content:** Include examples and case studies from different cultures.
- **Inclusive Language:** Use language that respects all students' identities and backgrounds.
- **Global Perspective**: Discuss communication in a global context, highlighting intercultural differences and similarities

Resources:

Adler, R. B., Rodman, G., & DuPré, A. (2016). Understanding Human Communication. Oxford University Press

DeVito, J. A. (2015). The Interpersonal Communication Book. Pearson.

McQuail, D. (2010). McQuail's Mass Communication Theory. Sage Publications.
academic articles, case studies, and multimedia resources provided throughout the course
https://courses.lumenlearning.com/publicspeakingprinciples/chapter/course-contents-at-a-glance/

Pedagogy: The entire course is a project work based which will be on the basis of the role play to practice real-life communication, one act plays, making interactive videos, taking interview, discussion on some topics of social relevance
Mentor will facilitate class discussions to encourage critical thinking and exchange their ideas and by conducting interactive workshops on specific skills like public speaking or active listening. Mentor will use videos, podcasts, and other media to illustrate communication principles on how to understand the difference in communication and effective communication, listening and effective listening. Mentor will work on how to frame the content and justify what they want to communicate. Mentor will provoke students to think of making their communication so impressive and valid that their point doesn't remain unnoticed
Different groups of students will be allotted different projects and to be carried out that will require different task during their field visits by explorations from their surrounding.

Mode of Evaluation:

The assessment structure for this program consists of two components: Internal assessment and external assessment. The internal assessment, shall account for 30% of the overall grade, on the basis of continuous performance monitoring through tests/

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester III
(For the Session Dec-2026, 2027 & 2028)

Course Code: UMDDDC-303

Course Title: Art and Science of Communication

Credits: 04
Contact Hours: 15 hours per credit

Maximum Marks: 100
Internal Evaluation:30
External Evaluation:70

quizzes/ presentations/ class participation/ small live projects emphasizing on development of skills in application, effective communication and teamwork.

The remaining 70% of the grade shall be accessed through a transdisciplinary major project, which will span an entire semester.
The evaluation of the major project would be comprehensive, considering various factors including the depth and accuracy of the project's content, the applied methodology, research rigor. The candidates will be evaluated on the basis of the change in their own communication skills, overcoming inhibitions and the assessment will be based on

- **Simulations and Case Studies**: Analyze real-world communication
- **Communication Labs**: Create a lab environment for practicing speeches and presentations
- **Community Engagement**: Encourage students to engage in community projects to practice communication in diverse settings.

Assessment will be further strengthening by offering strong feedback mechanism like:

- **Peer Reviews**: Facilitate peer reviews to allow students to critique and learn from each other.

- **Self-Assessment**: Encourage self-reflection and self-assessment of communication skills.
- **Instructor Feedback**: Provide detailed feedback on assignments and participation.

University of Jammu
Four Year Innovative Undergraduate Programme
Design Your Degree
Semester III
(For the session Dec-2026, 2027 & 2028)

Course code: UMDDDC-304

Credit: 04
Contact hours: 15 per credit

Course Title: Understanding the challenges of climate change
Maximum marks: 100
Internal Evaluation: 30
External Evaluation: 70

Course Objective:

Understanding the challenges of climate change is essential for addressing its impacts and implementing effective solutions.The objective of the course is deepening students' grasp of the scientific principles behind climate change, including the greenhouse effect, the carbon cycle, and the role of human activities involving history of climate science, current climate trends, and the effects of climate change on both natural and human systems. Students will also learn about policies and governance structures designed to combat climate change. Moreover, equipping students with the ability to interpret and analyze climate data, critically, evaluate information sources, and apply scientific knowledge to propose and assess potential solutions. The course will also enhance communication skills, enabling students to effectively convey climate change issues, and foster collaborative skills through team-based projects and research.Applying theoretical knowledge to real-world scenarios through case studies, simulations, and practical projects is the foremost objective. Students will also engage with local communities and stakeholders to develop practical, effective solutions to climate challenges. By the end of the course, students will have a robust understanding of the complexities of climate change, be equipped with the necessary skills to tackle these challenges, and be motivated to engage in proactive and informed climate action.

Learning Outcomes:

The course will enhance the student's ability to:

- understand and analyze impact of climate change on socio-economic growth;
- decipher the link between climate change and human civilization;
- understand role and application of data science in climate change;
- understand the causal mechanisms of the factors affecting climate variability;
- understand the role of climate variability in societal transformation;
- application of interdisciplinary approach to tackle climate issues.
- understand the relation between natural hazard and climate change.

The tangible learning outcomes will be observed when

- students will demonstrate their ability to explain key concepts such as the greenhouse effect, carbon cycle, and human impact on climate change through routine discussions and quizzes.
- students will produce in-depth case studies assessing the environmental and socio-economic impacts of climate change.
- students will complete projects involving the interpretation and analysis of climate data using statistical tools.
- students will participate in and complete group projects, demonstrating their ability to work collaboratively.

University of Jammu
Four Year Innovative Undergraduate Programme
Design Your Degree
Semester III
(For the session Dec-2026, 2027 & 2028)

Course code: UMDDDC-304

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Maximum marks: 100
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- students will write self-assessment reports reflecting on their learning progress and contributions to climate action throughout the course.

Topics for Discussion

- Climate change is real or a hoax?
  - In-depth understanding of climate change, historical perspective evidences.
  - Students will explore the causes, impacts, and potential solutions related to climate change at local and global level.
  - Through a comprehensive examination of scientific research, data, and expert opinions, participants will gain the knowledge and critical thinking skills necessary to navigate discussions surrounding climate change and distinguish facts from misinformation.
- International climate agreements – understanding role of global communities
  - Why are climate agreements so controversial?
    - Global opinion about climate change
  - How does the politics govern climate and climate govern world politics?
    - Deeper understanding of international climate agreements, and the role of world politics in governing these agreements.
  - What would be the role of Indian subcontinent, in next decade to tackle the issue of climate change?
- Climate Change and Social-Media
  - Exploring the intersection of climate change and social media, examining the influence of social media platforms on climate change discourse, communication, and activism.
  - Role of movies/entertainment/short films/dedicated TV channels in understanding the issue of climate change.
- Scientific approach and understanding the climate change
  - Scientific tools and procedures to understand the climate change.
  - Role of data science in climate change research and mitigation.
  - Understanding the impact of climate change on agriculture, water resources, ecosystems, human behavior, global economy, and socio-political component.
  - Natural disasters and climate changes. Is there any relation between these two? How can we mitigate the impact of natural disaster?
- Climate Change and Sustainable Development in the Jammu Region
  - Understanding impact of climate change on socio-economic cultural aspect of local communities in Jammu.
  - Explore mitigation strategies and sustainable development practices relevant to the region.
  - Developing skills for planning and implementing sustainable solutions in region.

University of Jammu
Four Year Innovative Undergraduate Programme
Design Your Degree
Semester III
(For the session Dec-2026, 2027 & 2028)

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Activities:

- Analysis of video shows on climate change and its impact
- Weekly group and biweekly individual seminar
- Quiz on field-based studies.
- Visit local ecosystems, interview experts, or participate in community initiatives focused on climate resilience and adaptation.
- Encourage students to find the real problem in the local areas and develop innovative solutions.
- Conduct research and study scientific literature, reports, and studies related to climate change
- Analyse case studies and real-world examples of the impacts of climate change and climate variability on various social and economic sectors.
- Engage in fieldwork and observations to gain firsthand experience of climate impacts and variability.
- Calculation of carbon footprint and ecological footprint.
- Temporal comparison of local flora.
- Effect of CO_2 on temperature experiments (Global Warming Simulation).
- Energy Consumption Experiment with Bulbs.
- Heat Island Effect Demonstration.
- Collection local climatic data of last 2-3 decades and its analysis.

Resources:

1. *Digital resources:*
   - Down to Earth: https://www.youtube.com/@D2E
   - United Nations (Climate Action): https://www.un.org/en/climatechange/what-is-climate-change
   - NASA (Global Climate Change): https://climate.nasa.gov/
   - Copernicus climate change program:https://bookdown.org/floriandierickx/bookdown-demo/
   - Environment and Climate Change Canada: https://www.youtube.com/@environmentcan
   - Green Ninja Academy: https://www.youtube.com/@GreenNinjaAcademy
   - Introduction to Atmospheric Dynamics: https://www.youtube.com/@introductiontoatmosphericd284
   - World Climate Research Program: https://www.youtube.com/@WCRP1980
2. *Books*
   - Climate change in practices - topics for discussion with group exercise (by Robert L. Wilby)

University of Jammu
Four Year Innovative Undergraduate Programme
Design Your Degree
Semester III
(For the session Dec-2026, 2027 & 2028)

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- Climate change past, present and future (Marie-Antoinette Mélières, ChloéMaréchal)
- Assessmentof Climate Changeover the IndianRegion -A Report of theMinistry of Earth Sciences (MoES),Government of India (edited by R. Krishnan · J. Sanjay ·ChellappanGnanaseelan · Milind Mujumdar ·Ashwini Kulkarni · Supriyo Chakraborty)
- Climate Change Science:A Modern SynthesisVolume 1 - The Physical Climate (by G. Thomas Farmer, John Cook)
- Goosse H., P.Y. Barriat, W. Lefebvre, M.F. Loutre, and V. Zunz (2010). Introduction
- to climate dynamics and climate modeling. Online textbook available at
- *http://www.climate.be/textbook*.
- Big Data Mining for Climate Change (byZhihua Zhang, Jianping Li)

Mode of Evaluation

The assessment structure for this program consists of two components: internal assessment and external assessment. The internal assessment, shall account for 30 per cent of the overall grade, on the basis of continuous performance monitoring through minor projects, group discussions, presentations/tests/quizzes, class participation, team work and 70% of the grade shall be assessed through a Major Project, which will span an entire semester. The evaluation of the major project would be comprehensive, considering various factors like identification of problem, methodology applied, tools used, data analysis and practical implication of the project. The project may involve choosing a specific war/local issue and conduct a detailed analysis of its long-term economic impacts, presenting their findings in a comprehensive research paper and oral presentation.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester III
(For the session Dec-2026, 2027 & 2028)

Course Code: UMDDDC-305
Credits: 04
Contact Hours: 15 per credit

Course Title: Technologies of the future
Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

This course aims to:

1. Explore emerging technologies and their potential impact on various industries and society.
2. Understand the principles and applications of key future technologies.
3. Analyse the ethical, social, and economic implications of adopting these technologies.
4. Encourage critical thinking and creativity in envisioning the future of technology.

Learning Outcomes:

By the end of this course, students should be able to:

A. Exhibit a deep understanding of the impact of emerging technologies.
B. Apply principles of key technologies in various scenarios.
C. Critically assess the ethical, social, and economic aspects of these technologies.
D. Demonstrate innovative and creative thinking regarding the future of technology.

Course Content:

Story of Emerging Technologies: Students will be exposed to the different technological environments in order to make them understand and identify the different aspects and parameters that comes under the ambit of a technology.

- Internet of Things (IoT)

In a bustling metropolis, imagine homes that think, cars that communicate, and healthcare systems that predict and prevent illnesses. This is the world of IoT. From smart refrigerators that order groceries to wearable devices that monitor health, IoT transforms our daily lives. However, with great connectivity comes great responsibility. We delve into the security challenges and ethical considerations that accompany this technological revolution.

Activities:

1. Create a presentation on IoT applications and their societal impacts.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester III
(For the session Dec-2026, 2027 & 2028)

Course Code: UMDDDC-305 | **Course Title: Technologies of the future**
Credits: 04 | **Maximum Marks: 100**
Contact Hours: 15 per credit | **Internal Evaluation: 30**
External Evaluation: 70

2. Conduct group research on specific IoT use cases across different industries.
3. Engage in a group discussion focusing on the security and ethical issues related to IoT.

- **Drones**

Picture a farmer surveying his vast fields with the help of a drone, a rescue team locating survivors in a disaster zone, and a city planner mapping out urban growth from the sky. Drones are the eyes in the sky that offer unprecedented perspectives and capabilities. We explore their integration with IoT and grapple with the regulatory and ethical questions they raise.

Activities:

1. Present on drone applications using real-world examples.
2. Research in groups on the impact of drones in various industries.
3. Discuss in groups the regulatory and ethical issues in drone usage.
4. Experience a hands-on drone demonstration, if feasible.

- **The Art of Cryptography and Blockchain Technology**

Students will be exposed to the mathematics behind the Art of Cryptography to make them fiddle with the algorithms responsible for maintaining the secrecy in transmission of Data on Networks i.e Whats app, Facebook, Twitter, Email, Financial Transactions etc

Imagine a world where financial transactions are transparent and secure, supply chains are tamper-proof, and personal data is decentralized and controlled by individuals. This is the promise of blockchain technology. We explore the fundamentals of blockchain, its role in powering crypto currencies like Bitcoin and Ethereum, and its potential applications in various sectors.

Activities:

1. Participate in a workshop on blockchain fundamentals.
2. Conduct group research on blockchain applications in specific industries.
3. Engage in group discussions on the future and potential of blockchain technology.

- **Augmented Reality (AR) and Virtual Reality (VR)**

Step into a classroom where history comes alive, a training session where surgeons practice complex procedures in a virtual environment, or a game that immerses you in an alternate reality. AR and VR are transforming the way we learn, train, and entertain ourselves. We explore the concepts, applications, and challenges of these technologies.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester III
(For the session Dec-2026, 2027 & 2028)

Course Code: UMDDDC-305
Credits: 04
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Course Title: Technologies of the future
Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

Activities:

1. Attend a workshop on AR and VR concepts.
2. Research in groups on AR and VR applications in specific fields.
3. Discuss in groups the potential and future of AR and VR technologies.

Mode of Evaluation:

The assessment structure for this program consists of two components: internal assessment and external assessment.

- Internal Assessment (30%): Continuous performance monitoring through tests, quizzes, presentations, class participation, and small live projects, emphasizing the development of skills in application, effective communication, and teamwork.
- External Assessment (70%): A transdisciplinary major project spanning an entire semester.

The evaluation of the major project will consider:

- The depth and accuracy of the project's content.
- The applied methodology and research rigor.
- The effective use of IT tools and data analysis.
- The meaningful findings and practical implications derived from the project.
- Testing of innovativeness, communication, and problem-solving skills.

University of Jammu
Four Year Innovative Undergraduate Programme
Design Your Degree
Semester III
(For the session Dec-2026, 2027 & 2028)

Course code: UMDDDA-307

Credit: 04
Contact hours: 15 per credit

Course Title: The Art of Mathematical Modelling
Maximum marks: 100
Internal Evaluation: 30
External Evaluation: 70

Objectives: The objectives of the course on "The Art of Mathematical Modelling" include:

- Translate real –world problems into mathematical terms and structures;
- develop mathematical models that represent the essential aspects of the problem;
- usemathematicaltechniques,inparticular,differencemethodandordinary differential equations, to analyze and study the models;
- solvingthecorrespondingordinarydifferentialequationsusingnumerical techniques;
- Validation of the model.

Pre requisite of the course- Course Number:UMDDDA-307

- **Motivation:** The real world is nature's embodiment and change is the law of nature. Thus, the rate of change comes into play. All physical phenomena involve the rate of change, which in mathematical terms is called the derivative of a function representing that phenomenon. Therefore, to find solutions to real-world problems, we need to have a mathematical formulation of that problem generally known as Mathematical modelling. After converting the phenomenon into a mathematical setting, one can use mathematical tools and techniques to analyze and solve the problem. The solution is then reformulated back to the original term in which the problem exists in the real world.
- To find the solutions to real-world problems, the students are required to have some knowledge of calculus. In fact, the knowledge of ordinary differential equations is indispensable for handling such problems.
- How a physical phenomenon is governed by a differential equation.

(1) Introduction
Detailed Content: One can take any physical phenomenon, for example, population growth.
(a) Consider a discrete-time model of population growth through population data and solve the population growth problem using difference equations.

University of Jammu
Four Year Innovative Undergraduate Programme
Design Your Degree
Semester III
(For the session Dec-2026, 2027 & 2028)

Course code: UMDDDA-307

Course Title: The Art of Mathematical Modelling

Credit: 04
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(b) Represent the population size as a function of time and the rate of change of population, that is, the derivative of the function at a given point of time. Then explain how the given population growth phenomenon is converted into a differential equation.
(c) **Activities:** Simple real-life problems and their mathematical formulations.

(2) Introduction to Difference Equations
Detailed Content:
(a) Explain recursion and iteration for first and second-order difference equations.
(b) Explain Generating functions and systems of difference equations, Logistic Equation.
(c) **Activities:** Exercises on first and second-order difference equations.
(d) **Assignments:** Problem sets on real-life applications of difference equations, for example, a model of a population of rabbits, a case of a single cold pill, and a model of the economy.

(3) First-Order Differential Equations-Basics
Solving linear first-order ODEs, separable equations, integrating factor method.
Detailed Content:
(a) Explain the methods to solve linear first-order differential equations.
(b) Explain separable equations and how to solve them.
(c) Introduce the integrating factor method.
(d) **Activities:** Exercises on solving basic first-order differential equations.
(e) **Assignments:** Problem sets on first-order differential equations and solution of the problem "Spread of a Rumor: Discrete Logistic Growth".

(4) First-Order Differential Equations-Applications
Growth and decay models, cooling problems, mixing problems.
Detailed Content:
(a) Exponential Growth: The Math behind "going viral".
(b) Explain the formulation and solution of the growth model.
(c) Explain the formulation and solution of the decay model.
(d) Cover cooling problems and mixing problems in practical contexts.
(e) **Activities:** Practical problem- solving sessions.
(f) **Assignments:** Homework on applying first-order ODEs to real-life problems.

(5) Numerical Techniques to solve first-order differential equations
Detailed Content:
(a) Introduce numerical methods for solving ODEs.
(b) Introduce Euler's method and its application.
(c) Discuss improved Euler's method and Runge-Kutta methods.
(d) **Activities:** Computational labs using MATLAB.
(a) Plotting of first-order solution of differential equation;
(b) Growth model (Exponential case only);
(c) Decay model(Exponential case only);
(d) Lake pollution model(with constant/seasonal flow and pollution concentration);
(e) Limited growth of population(with harvesting);
(f) Limited growth of population(without harvesting);
(e) **Assignments:** Numerical exercises on solving ODEs.

University of Jammu
Four Year Innovative Undergraduate Programme
Design Your Degree
Semester III
(For the session Dec-2026, 2027 & 2028)

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(6) Modelling with difference and differential equations
Detailed Content:
(a) Discuss the process of formulating real-life problems using difference and differential equations.
(b) Explain to students how to solve these equations and interpret the results.
(c) **Activities:** Practical applications and problem-solving sessions.
(d) **Assignments:** Problem sets on real-life applications.

(7) Model Validation and Verification
Methods of validating models, sensitivity analysis, and ensuring accuracy and reliability.
Detailed Content:
(a) Explain methods for validating mathematical models.
(b) Discuss sensitivity analysis and its importance.
(c) Explain how to ensure the accuracy and reliability of models.
(d) **Activities:** Validation exercises on previously learned models.
(e) **Assignments:** Homework on model validation and verification.

(8) Case Studies in Biology.
Modelling population dynamics, and logistic growth.

Pedagogy: Mentor must introduce each topic with the help of real-life situations/problems so as to give complete understanding of the concept and enabling the students to find solutions to the problems at their own by "How to Solve it" approach. Mathematical concepts must come to the students in a natural way instead of imposing on them.

Reference Books for self- study:

(1) Ross S.L. Differential Equations, 3rd edition. India: John Wiley and Sons, 2004.
(2) RaiB., Choudhury D.P. and Freedman H.I.A Course in Ordinary Differential Equations. Alpha Science International Ltd.2012.
(3) Codington E.A. An Introduction to Ordinary Differential Equation. New York: Dover Publications, 1989.
(4) Barnes, Belinda and Glenn R. Fulford. Mathematical Modeling with Case Studies: A Differential Equation Approach using Maple and MAT LAB,2nd Ed.London and New York:Taylor and Francis group, 2009.
(5) Hilbert, S., Maceli, J., Robinson, E., Schwartz, D., and Seltzer, S. Calculus: An ActiveApproachwithProjects.MathematicalAssociationofAmerica, 2010.

University of Jammu
Four Year Innovative Undergraduate Programme
Design Your Degree
Semester III
(For the session Dec-2026, 2027 & 2028)

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Credit: 04
Contact hours: 15 per credit

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Internal Evaluation: 30
External Evaluation: 70

Mode of Evaluation

The assessment structure for this program consists of two components: internal assessment and external assessment. The internal assessment, shall account for 30 per cent of the overall grade, on the basis of continuous performance monitoring through minor projects, group discussions, presentations/tests/quizzes, class participation, team work and 70% of the grade shall be assessed through a Major Project, which will span an entire semester. The evaluation of the major project would be comprehensive, considering various factors like identification of problem, methodology applied, tools used, data analysis and practical implication of the project. The project may involve choosing a specific war/local issue and conduct a detailed analysis of its long-term economic impacts, presenting their findings in a comprehensive research paper and oral presentation.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)

Semester 4th

Course Code	Course Title	Credits	Contact Hours (per Credit)
UMDDDC-401	Digital Humanities	04	15
UMDDDC-402	Demystifying Human Behaviour	04	15
UMDDDC-403	Food as Medicine: Traditional and Modern Practices	03	15
UMDDDC-404	Exploring Tourism in J&K: An Entrepreneurial Perspective	04	15
UMDDDC-405	Exploring the world of Cinema With Smart Phones	03	15
UMDDDC-406	Marvels of the World	02	15
UMDDDA-407	The Art and Science of Predictions	04	15

Prof. Alka Sharma
Director, SIIEDC

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester IV
(For the session May- 2027, 2028 & 2029)

Course Code: UMDDDC-401
Credits: 04
Contact Hours: 15 per credit

Course Title: Digital Humanities
Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

Course Objectives:

1. To introduce students to the interdisciplinary field of Digital Humanities (DH), blending technology with humanities research.
2. To equip students with hands-on experience in using digital tools and methods for analyzing, interpreting, and presenting humanities data.
3. To foster critical thinking about the implications of digital technology on humanities disciplines.
4. To encourage collaborative and project-based learning, emphasizing practical applications of digital methods in humanities.

Learning Outcomes:

By the end of the course, students will be able to:

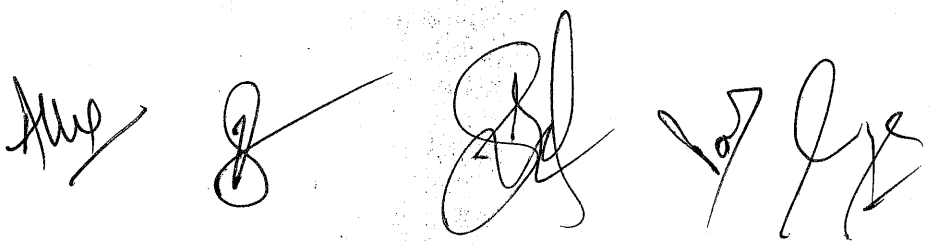
1. Understand the core concepts, history, and scope of Digital Humanities.
2. Apply digital tools and methodologies to analyze and visualize humanities data.
3. Design and execute a DH project, incorporating collaborative and interdisciplinary approaches.
4. Critically evaluate the ethical, social, and cultural implications of using digital technologies in humanities.
5. Develop skills in digital storytelling, text analysis, and data visualization

Introduction to Digital Humanities

- Historical development and key debates in Digital Humanities.
- Overview of major tools and technologies.

Activities:

- Group discussion: What does "Digital Humanities" mean to you?
- Case study analysis: Examples of successful DH projects.



University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester IV
(For the session May- 2027, 2028 & 2029)

Course Code: UMDDDC-401
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Course Title: Digital Humanities
Maximum Marks: 100
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- ❖ Tool exploration: Brief introduction to tools like Voyant, Zotero, and Omeka.

Digital Textual Analysis

- ➢ Text mining and corpus analysis.
- ➢ Topic modelling and sentiment analysis.
- ➢ Natural language processing basics.

Activities:

- ❖ Hands-on workshop: Using Voyant for text analysis.
- ❖ Mini-project: Analyzing themes in a chosen literary text or historical document.
- ❖ Reflection session: Discussing insights from the text analysis.

Data Visualization and Digital Mapping

- ➢ Introduction to data visualization principles.
- ➢ Tools for visualization: Tableau, Gephi, and Flourish.
- ➢ GIS and spatial humanities: Mapping historical and cultural data.

Activities:

- ❖ Workshop: Creating visualizations using Tableau.
- ❖ Collaborative project: Mapping cultural or historical events using GIS tools.
- ❖ Peer review: Presenting and critiquing visualizations.

Digital Storytelling and Collaborative Projects

- ➢ Digital storytelling techniques and platforms.
- ➢ Collaborative project management and tools.
- ➢ Ethics and copyright in digital humanities.

Activities:

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester IV
(For the session May- 2027, 2028 & 2029)

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Course Title: Digital Humanities
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- Creating a digital story using tools like StoryMapJS or Twine.
- Group project: Developing a small-scale DH project.
- Reflection and feedback session: Sharing experiences and challenges.

Pedagogical Approaches:

The pedagogy for the Digital Humanities (DH) course is based on an interdisciplinary, experiential, and collaborative learning approach. Students will be actively engaged through discussions, hands-on workshops, and project-based activities designed to bridge technology and humanities research. The course emphasizes exploratory learning, where students will interact with digital tools and methodologies to analyze and present humanities data while considering its ethical, social, and cultural implications. Each module integrates practical applications, including tool exploration, text analysis, data visualization, and digital storytelling. Collaborative projects will play a central role, requiring students to work in teams, manage tasks, and develop solutions to real-world humanities questions. Students will engage in critical discussions, reflective learning sessions, and peer reviews to deepen their understanding and enhance their skills.

Mode of Evaluation:

The evaluation for the Digital Humanities course consists of two components: **internal assessment** and **external assessment**, ensuring a holistic evaluation of students' performance.

Internal Assessment (30%):

This component focuses on continuous performance monitoring to develop skills in application, effective communication, and teamwork.

Class Participation (10%): Encourages active involvement in discussions and activities, promoting meaningful engagement.

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester IV
(For the session May- 2027, 2028 & 2029)

Course Code: UMDDDC-401
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Mini-Projects (20%): Facilitates focused exploration of specific tools and methodologies, enhancing practical knowledge and problem-solving abilities.

External Assessment (70%):

The external assessment is centered on a semester-long transdisciplinary major project that demonstrates the practical application of Digital Humanities methodologies.

Digital Humanities Project (30%): Promotes interdisciplinary teamwork to produce a comprehensive and innovative outcome.

Reflection Papers (20%): Provides a platform for critical analysis of readings, experiences, and project development.

Final Presentation (20%): Offers an opportunity to showcase the project's process, findings, and outcomes in a structured and professional manner.

Book References:

1. Gold, M. K. (Ed.). (2012). Debates in the Digital Humanities (NED-New edition). University of Minnesota Press. http://www.jstor.org/stable/10.5749/j.ctttv8hq
2. Berry DM (ed.). 2012. *Understanding Digital Humanities*, Houndmills: Palgrave Macmillan
3. Underwood, T. (2019). Distant Horizons: Digital Evidence and Literary Change, University of Chicago Press
4. JOCKERS, M. L. (2013). Macroanalysis: Digital Methods and Literary History. University of Illinois Press. http://www.jstor.org/stable/10.5406/j.ctt2jcc3m
5. Graham, S., Milligan, I., & Weingart, S. (2015). Exploring Big Historical Data: The Historian's Macroscope.

University of Jammu
Four Year Innovative Undergraduate Program
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6. Martyn Jessop, Digital visualization as a scholarly activity, *Literary and Linguistic Computing*, Volume 23, Issue 3, September 2008, Pages 281–293, https://doi.org/10.1093/llc/fqn016
7. Alexander, B. (2011). The New Digital Storytelling: Creating Narratives with New Media.Bloomsbury Publishing
8. McPherson, T. (Ed.) (2008). Digital Youth, Innovation, and the Unexpected. MIT Press

University of Jammu
Four Year Innovative Undergraduate Program
(Design Your Degree)
Semester: 4th
(For the Session May- 2027, 2028 & 2029)

Course Code: UMDDDC-402

Course Title: Demystifying Human Behaviour

Credits: 04
Contact Hours: 15 hours per credit

Maximum Marks:100
Internal Evaluation: 30
External Evaluation:70

Course Objectives

- To understand why people think, feel and act the way they do
- To systematically observe, analyze and develop insight of human behavior
- To understand the core drivers of behaviour

Outcomes

- To create better habits, shift thought patterns, and control emotional triggers
- To develop interventions to behave in a better ways
- To develop App for monitoring behavior

Biological Foundations of behaviour:

Exploring the biological factors that influence human behavior, including genetics, brain structure, exploring automated systems of the human body and their relationship with our behavior.

Activity:

1. How does human brain play role in shaping behavior? Collect evidences and discuss.
2. Which brain parts are involved in behavioral change? Can we improve or transform behaviour? Techniques and methodology to study the same.
3. Design an experiment to find if hormones and which hormones play a role in behavioral differences in various genders if so.
4. Do we inherit behavior? Discussion and activity to find out if so.
5. Conduct experiments to test behavioral change pre- and post-intervention.

Resources:

1. The Female Brain, a book by Louann Brizendine
2. The Male Brain, a book by Louann Brizendine.
3. The Mind and the Brain: Neuroplasticity and the Power of Mental Force. Book by Jeffrey M. Schwartz and Sharon Begley

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4. How Genes Influence Behavior,a book by Jonathan Flint

Movies:

A Beautiful Mind, based on A mathematical genius, John Nash and directed by Ron Howard.

https://www.youtube.com/watch?v=gkrM1gMpqRU

https://www.youtube.com/watch?v=fISwz3DvrII

https://www.youtube.com/watch?v=GogLW14WEb0

https://www.youtube.com/watch?v=yQ6VOOd73MA

Psychological, socio cultural and evolutionary factors of behavior

Influence of Thoughts, Emotions, Environment, and Unconscious Processes on Human Actions and Behavior, Impact of Social Conditioning and Group Dynamics on Behavior Development, Significance of Survival Instinct in Shaping Human Behavior

Activity

- Data collection with the help of questionnaires/interviews/ case studies/online resources for data collection/ research studies on human behavior, Analyzing and interpreting the data
- Thought-Emotion-Behavior Mapping
- Environmental Triggers Analysis
- Unconscious Bias Test
- Social Norms Challenge
- Conformity Experiment

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- Role-Playing Cultural Conditioning
- Fight-or-Flight Simulation
- Scarcity Mindset Experiment
- Evolutionary Behavior Debate

Resources:

Films and Documentaries:

1. "Inside Out" (2015)
2. "The Stanford Prison Experiment" (2015)
3. "Study" (2012)
4. "Eighth Grade" (2018)
5. "Whiplash" (2014)

Books:

1. "Influence: The Psychology of Persuasion" by Robert Cialdini"
2. The Social Instinct: How Cooperation Shaped the World" by Nichola Raihani:
3. "Behave: The Biology of Humans at Our Best and Worst" by Robert M. Sapolsky
4. "The Naked Ape: A Zoologist's Study of the Human Animal" by Desmond Morris:
5. "Connected: The Surprising Power of Our Social Networks and How They Shape Our Lives" by Nicholas A. Christakis and James H. Fowle

Online Resources:

- "How Films Reach Into Our Unconscious" by Psychology Todaypsychologytoday.com
- "The Ecology of Human Fear: Survival Optimization and the Nervous System"pmc.ncbi.nlm.nih.gov
- "Inside Out – A Psychological Insight"

Brain Activities and EEG

Introduction to Brain Activities, Neurons, synapses, and brain waves (Alpha, Beta, Gamma, Theta,

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Delta), EEG (Electroencephalography), How EEG works and its applications, Basics of EEG signal processing.

Activity 1: Explore open-source EEG datasets (e.g., DEAP, SEED).
Activity 2: Use Python libraries (e.g., MNE-Python) to visualize EEG signals.

Project: Analyze a small EEG dataset and create a visualization of brain wave patterns

Data Preprocessing, Cleaning and normalizing EEG data

Feature extraction from EEG signals, Exploratory Data Analysis (EDA), Visualizing emotional data using graphs and charts AI-Based Emotion Classification, Introduction to Machine Learning (ML), Supervised learning basics, Common ML algorithms (e.g., SVM, Random Forest), Building Emotion Classification Models, Training and testing ML models on EEG datasets, Evaluating model performance (accuracy, precision, recall)

Activity 1: Preprocess an EEG dataset using Python (e.g., filtering noise, extracting features).
Activity 2: Perform EDA on an emotion dataset using Pandas and Matplotlib.

Project: Prepare a report on the analysis of an emotion dataset, highlighting key findings

Activity 3: Train a simple ML model (e.g., SVM) to classify emotions using an EEG dataset.
Activity 4: Build a deep learning model (e.g., CNN) for emotion classification.

Project: Develop an AI-based emotion classification system using EEG data and present the result

Final Project Description

Students will work in teams to:

1. Preprocess and analyze an EEG dataset.
2. Build and evaluate an AI model for emotion classification.
3. Present their findings in a report and presentation.

Deliverables:
A working prototype or model and a final report and presentation

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Key Tools and Resources

1. EEG Datasets: DEAP, SEED, DREAMER.
2. Software: Python, Jupyter Notebook, MNE-Python, TensorFlow, PyTorch.
3. Libraries: Pandas, NumPy, Matplotlib, Scikit-learn

Pedagogy: The entire course is a kind of project work which will be pre reads, discussions, activities and explorations of understanding, data gathering from general population and using AI resources to demystifying the behavior from different context. Mentor will provoke students to think innovatively and understand different context and causes of behavior and the factors leading to different behaviours among people hence broadening their understanding about different perceptions, learning, personalities, attitudes and values of the people. students will be allotted different projects in groups which needs to be carried by field visits, interacting with people as well as lab work. The students will also be mentored to learn the AI applications for behavioral monitoring

Mode of Evaluation:

The assessment structure for this program consists of two components: internal assessment and external assessment. The internal assessment, shall account for 30% of the overall grade, on the basis of continuous performance monitoring through tests/ quizzes/ presentations/ class participation/ small live projects emphasizing on development of skills in application, effective communication, and teamwork.

The remaining 70% of the grade shall be accessed through a transdisciplinary major project, which will span an entire semester.

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Internal Evaluation: 30

External Evaluation:70

The evaluation of the major project would be comprehensive, considering various factors including the depth and accuracy of the project's content, the applied methodology, research rigor, the effective use of IT tools and data analysis, as well as the meaningful findings and practical implications derived from the project. The assessment shall also include testing innovativeness, communication and problem solving.

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Course Code: UMDDDC-403

Course Title: Food as Medicine: Traditional and Modern Practices

Credits: 03
Contact Hours: 15 hours per credit

Maximum Marks:75
Internal Evaluation: 25
External Evaluation:50

Learning objectives:

1. To understand the foundational principles of food as medicine.
2. To identify real-world nutritional challenges and propose practical solutions.
3. To analyze the political and social aspect of food, including food security policies and their impact

Learning Outcomes:

1. To develop basic entrepreneurial skills to create innovative nutrition-based ventures.
2. Gain hands-on experience in designing and implementing nutrition interventions.
3. Work collaboratively in teams and engage with communities and experts effectively.

Foundations of Food as Medicine

Historical perspective of food as medicine: Revitalizing traditional food practices to improve health outcomes, disease management and prevention through diet.
Activities:

- Develop a list/quiz on nutrition required during infancy, childhood, adolescence
- Workshop: Explore traditional Indian medicinal diets (e.g., turmeric milk, khichdi). Create a "functional food plate" using local ingredients and present its health benefits.
- Case Study: Analyze successful nutrition interventions in India, such as combating anaemia through iron-rich diets.

Nutrition for Cognitive and Mental Health

Impact of macro- and micronutrients on brain development and learning, dietary pattern during the Stress and other mental health issues. Mindful eating and emotional well being: Strategies for promoting mental clarity and emotional resilience through nutrition. , impact of social norms and peer influence in shaping food habits

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Activities:

- Study the apps in eating behaviour
- Experiential Learning: Conduct a simple dietary assessment in a community or school to identify nutrient gaps
- Reflective Workshop: Design a balanced meal plan for schoolchildren to develop a "Mindful Eating Plan" and document its impact over a week
- Community Engagement: Discuss dietary habits and mental health awareness in small focus group discussion

Social and Political Impact of Food

Mid day meal scheme and its social impact, Case Studies of Women as Food Leaders, Rural women forming food cooperatives and dairy collectives (eg Amul)

Activities:

- Field Visit: Observe a mid-day meal program or similar nutrition initiative
- To study initiatives like community gardens, farmers' markets
- Future of Women as Food Leaders & Change-Makers research in rural areas of Jammu
- Social Campaigns: Use storytelling and real-life examples to inspire dietary changes in a non-judgmental way
- Role play on food is central to social gatherings, celebrations, and family traditions, influencing dietary choices and habits

Entrepreneurship in Nutrition

- **Innovation in Food-Based Solutions:**
  Identifying gaps in the nutrition market.
  Basics of product development and prototyping.
- **Business Planning:**
  Essentials of building a sustainable business model.
  Marketing and branding for food-based ventures.
- **Social Entrepreneurship:**
  Creating impactful community nutrition programs.

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Activities:

- Ideation Workshop: develop basic prototype like nutrient rich snacks and beverages
- Project Work: Draft a business plan for a food-based startup or community initiative.
- Explore Culinary tourism You tube and various aspects of enterprenurship with food

Suggested Readings and Resources

Books

1. Caldecott, T. (2011). Food as medicine: The theory and practice of food. Frog Books.
2. DK Publishing. (2013). Healing foods: Eat your way to a healthier life. DK Publishing.
3. Lesser, M. (2006). Nutrition and mental health: A comprehensive overview of diet, lifestyle, and mental health. Health Press.
4. Morningstar, A. (1995). Ayurvedic nutrition and cooking. Lotus Press.
5. Saarela, M. (Ed.). (2011). Functional foods: Concept to product (2nd ed.). Woodhead Publishing.

Research Papers and Articles

1. Fernstrom, J. D. (2000). The role of nutrition in cognitive and mental health. Clinical Nutrition Insights, 2(6), 1-5.
2. Mid-Day Meal Scheme: A study on its impact on nutrition and education in India. (2010). Economic and Political Weekly, 45(21), 52-59.
3. Probiotics and gut-brain communication: The link to mental health. (2019). Frontiers in Psychiatry, 10, 456. https://doi.org/10.3389/fpsyt.2019.00456
4. Ayurveda and functional foods: Applications and scope. (2018). Journal of Traditional and Complementary Medicine, 8(4), 343-350.

Online Resources

1. National Institute of Nutrition (India). (n.d.). Dietary guidelines for Indians. Retrieved from https://www.nin.res.in
2. Food and Agriculture Organization (FAO). (n.d.). Food systems and nutrition. Retrieved from http://www.fao.org

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3. Ayush Research Portal (Government of India). (n.d.). Research on Ayurveda, Siddha, and traditional medicine. Retrieved from http://ayushportal.nic.in
4. World Health Organization. (2014). WHO traditional medicine strategy: 2014-2023. Retrieved from https://www.who.int/health-topics/traditional-medicine

Case Studies

1. Government of India. (n.d.). Anemia Mukt Bharat Program. Retrieved from https://www.nhm.gov.in
2. Fortification of edible oils in Rajasthan. (2019). Fortify Health India. Retrieved from https://www.fortifyhealth.org
3. Mid-Day Meal Scheme in Tamil Nadu. (2018). Tamil Nadu Government. Retrieved from https://www.tn.gov.in

Pedagogy:

The entire course is a kind of project work which will be pre reads, discussion activities and explorations of foods from the surroundings and how can the food be used as asource of medicine and bringing change in the society. Mentor will provoke students to think innovatively about the naturally existing qualities of food and their uses.

Different groups of students will be allotted different projects and to be carried out that will require different task at their own like field visits and explorations from the surrounding as well through online mode along with general guidance/supervision

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Course Code: UMDDDC-404

Course Title: Exploring Tourism in J&K: An Entrepreneurial Perspective

Credits: 04
Contact Hours: 15 per credit

Maximum Marks: 100
Internal Evaluation: 30
External Evaluation: 70

Course Objectives

Jammu & Kashmir has tremendous potential in tourism sector owing to its natural beauty, cultural significance, diversity and variety of locations. Tourism has been a major contributor to region economy and also contributes to employment. Innovation in the tourism industry with the use of new ideas, products, and methods to improve customer experiences, efficiency, and economic growth can generate a variety of entrepreneurial opportunities.

This course will

1. Equip students with entrepreneurial skills specific to the tourism industry.
2. Provide insights into the cultural, historical, and natural attractions of Jammu & Kashmir.
3. Develop strategies to leverage sustainable tourism in the region.
4. Address challenges of the tourism sector by proposing innovation business solutions

By the end of the course, students will:

- Develop viable tourism business plan tailored to Jammu & Kashmir.
- Understand the region's tourism potential and challenges.
- Integrate sustainable and community-centric practices into tourism ventures.
- Leverage modern marketing and technology tools for success of the proposed solution

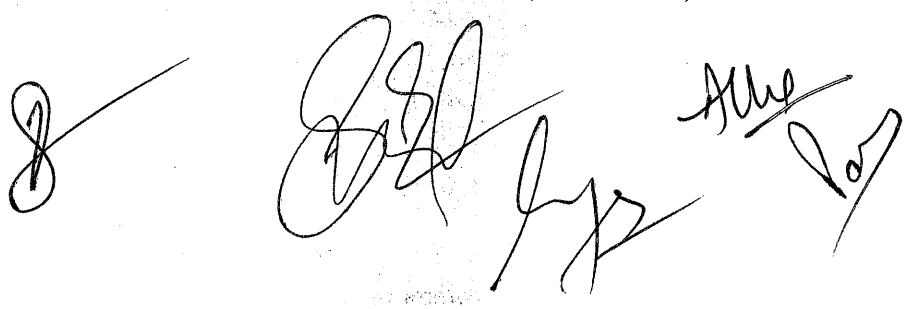
Understand the Basics of Tourism

- Components of Tourism Industry
- Types of Tourism
- Tourism Value Chain: Understanding Stakeholders in the Tourism Sector
- Travel Motivations
- Tourist Typologies
- Legal, Regulatory and Policy Framework in Tourism Sector

Mapping the Tourism Resources

The students will be encouraged to identify, understand and map the various types of tourism resources for each district in Jammu & Kashmir. They will focus on the following

- Natural Resources (Landscapes, Waterbodies, Forest and Wildlife)
- Cultural Resources (Historical Monuments, Art & Craft, Festivals & Events, Cuisine)



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- Adventure Tourism Resources
- Rural & Agro Tourism Resources
- Health & Wellness Tourism Resources
- Pilgrimage and Spiritual Tourism Resources

Innovation in Tourism

The students will be encouraged to identify and understand various global innovations that have transformed tourism and hospitality sector at the global level. The insights derived will help them develop their major project

- Sharing Economy in Tourism (e.g. AirBnB, Uber, Experience sharing)
- Eco Tourism and Sustainable Tourism Innovations
- Digital and Technology Driven Innovations (e.g. VR, AR, AI Driven Models, Blockchain)
- Cultural and Experiential Tourism Innovations (e.g. Authentic local experiences)
- Gastronomy and Hospitality Innovations (e.g. Cloud Kitchens, Farm to Table Experiences, Automated Dining Experiences)
- Health and Wellness Innovations (e.g. wellness retreat, sleep tourism, digital detox vacations)

Entrepreneurship in Tourism

Based on the learning from the above, students will

- Developing a Comprehensive Business Plan for a Tourism Startup
- Prototyping Innovative Tourism Products or Services
- Pitching a Tourism Venture to Potential Investors

Pedagogy

This course will follow and experiential based learning pedagogy, wherein the students will immerse themselves in real world tourism opportunities and challenges. While working in groups they will identify problems, challenges and opportunities which are being faced by the tourism stakeholders in J&K. They will also be interacting with industry leaders, do field visits to understand the tourism resources. Different groups of students will be allotted different projects and to be carried out that will require different task at their own like field

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visits and explorations from the surrounding as well through online mode along with general guidance/supervision

Reference Books

- "Smart Tourism: Exploring the Role of Technology in Tourism" – Zheng Xiang, Alastair M. Morrison
- "Responsible Tourism: Using Tourism for Sustainable Development" – Harold Goodwin
- "Sustainable Tourism on a Finite Planet" – Megan Epler Wood
- "Marketing for Hospitality and Tourism" – Philip Kotler, John T. Bowen & James Makens
- "Tourism: Principles, Practices, Philosophies" – Charles R. Goeldner & J.R. Brent Ritchie
- "The Business of Tourism" – Chris Holloway & Claire Humphreys

Web Resources

Students are advised to visit websites, follow social media handles of the following organizations to get updated on latest policies and trends

- UNWTO (United Nations World Tourism Organization) ;
- WTTC (World Travel & Tourism Council);
- PATA (Pacific Asia Travel Association);
- IATO (Indian Association of Tourism Operators)
- Ministry of Tourism, Government of India
- Ministry of Culture, Government of India
- State Government Tourism Websites
- Global Sustainable Tourism Council
- Skift, Hospitality Net, Trip Advisor
- Lonely Planet

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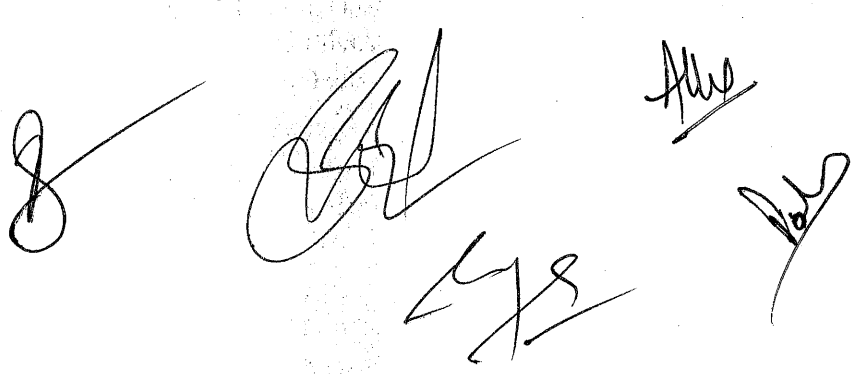

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Course code: UMDDDC-405

Credit: 03
Contact hours: 15 per credit

Course Title: Exploring the world of cinema with Smartphones
Maximum marks: 75
Internal Evaluation: 25
External Evaluation: 50

Learning Outcomes

The course will enhance the student's ability to:

- ✓ Understand the value of cinema, various aspects of film making, its scope and the available market.
- ✓ Learn professional script- writing for various types of films (short films, documentaries films, feature films etc.)
- ✓ Be acquainted with their creativeness and aptitude for exploring the possibility of carrier in film Industry.

The tangible learning outcomes will be observed when

- ✓ Students will learn how to craft a compelling narrative that communicates their chosen issue to a wide audience.
- ✓ Students will complete projects that involve analyzing and interpreting various topics/themes through the use of filmmaking tools.
- ✓ Students will engage in group projects, demonstrating their ability to collaborate effectively with peers.
- ✓ Students will write self-assessment reports reflecting on their strengths and areas for improvement, while considering how their use of smartphone technology has enhanced their creative process and teamwork.

➢ Topics for Discussion

- ✓ Role of cinema in evolution of Society, narrations building, Components of Film making: Screenwriting, cinematography, production design, sound design, editing, visual effects, and post-production
- ✓ Film techniques: Camera angles, color, sound effects, music, and working with actors.
- ✓ Essential Steps for film making: The Idea, The Script, The Storyboards, The Cast and Crew, The Locations, The Filming, The Post-Production
- ✓ Step-by-step guide to creating your movie script- Write your logline. Create an outline, Build a treatment, Write your screenplay, Format your screenplay, Edit your screenplay, Action lines, Camera angles, Character names, Dialogue descriptions, Dialogue, Locations, Off-screen or off-camera, Scene headings, Voiceover

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- ✓ Steps for using camera in film making- Shot list, Crane shot, First assistant camera, Pre-production, Development, Film editing, Distribution, Types of camera shots and angles used in film making- Medium shot, POV shot, Shoulder level shot, Long shot, Low angle shot, Two shot, Aerial shot, Tilt, Tracking shot
- ✓ Stages of Production- Development, Pre-production, Production, Post-production, Distribution
- ✓ Steps to Post productions- Editing the Content, Sound Editing and Adding Music, Adding Visual Effects, Sound Mixing, Color Grading, VFX
- ✓ Common Tools Used for Post Production- Adobe Premiere Pro, Final Cut Pro, Apple Logic Pro X and Adobe Audition, etc.
- ✓ Gaming, Graphic Designing, Animation & VFx, Photography, Print Media, Industrial Design
- ✓ Range of products of entertainment industry- Movies, cartoon making, Digital painting, TV shows, Radio shows, News, Music, Newspapers and magazines, Books, Video games, Streaming, Live performances, youtube, OTT channels
- ✓ Govt. Schemes for promotion of this industry, National and International Awards

➢ Activities:

- Analysis of video in film- making, script- writing, screen plays, camera elements, direction, acting and post- production using Smartphone.
- Visit to local production houses, Doordarshan, All India Radio, interview with experts associated with film making.
- Documentation of information concerning local cinema players and their achievements in last 2-3 decades.

➢ Mode of Evaluation-

Major project: The students shall be divided into 4 to 5 groups and evaluated on the basis of 10-12 minutes product (short documentary film) on their chosen themes using smartphone.

Minor Project: student shall be allotted various task of film-making such as Script-writing, dialogues, acting, editing etc. and evaluated accordingly.

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Resources

Top 20 Best Websites for Filmmakers (https://www.actionvfx.com/blog/20-best-websites-for-filmmakers-in-2023)
ActionVFX
ProductionCrate
Pond5
RawFilm
Shutterstock
PremiumBeat
Adobe Creative Cloud
Red Giant
Autodesk
Blackmagic Design
Color Grading Central
FilmConvert
StudioBinder
Celtx
Frame.io
No Film School
Film Riot
ProVideo Coalition
IMDb pro
CineD

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Course Code: UMDDDC-406
Credits: 02
Contact Hours: 15 per credit

Course Title: Marvels of the World
Maximum Marks: 50
Internal Evaluation: 15
External Evaluation: 35

Course Objectives:

1. Introduce students to the scientific principles behind everyday phenomena across Physics, Chemistry, Biology, and Electronics.
2. Foster curiosity and inquiry through hands-on experiments and simple project-based learning activities.
3. Develop foundational skills in scientific observation, measurement, analysis, and interpretation.
4. Encourage interdisciplinary thinking by connecting concepts across the natural and physical sciences.
5. Promote teamwork, communication, and creativity through collaborative group projects and presentations.
6. Inspire appreciation for the role of science and technology in solving real-world problems and improving daily life.

Learning Outcomes:

By the end of the course, students will be able to:

1. Explain fundamental scientific concepts underlying natural phenomena such as light, sound, magnetism, chemical reactions, biological systems, and basic electronics.
2. Design and conduct simple experiments or projects to explore real-world scientific principles using low-cost, accessible materials.
3. Analyze and interpret experimental results, demonstrating an understanding of cause-effect relationships and underlying mechanisms.
4. Communicate scientific ideas and project findings effectively, both orally and in writing, through presentations, demonstrations, and reports.
5. Collaborate in teams, applying skills in inquiry, observation, problem-solving, and creative thinking to complete group projects.
6. Reflect on the role of science and technology in everyday life and develop a curiosity-driven approach to understanding the natural and engineered world.

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Course Title: Marvels of the World
Maximum Marks: 50
Internal Evaluation: 15
External Evaluation: 35

Physics – Everyday Marvels of Nature

Theme: Explore natural phenomena like light, sound, magnetism, and mechanics in action.

Suggested Experiments/Projects:

- Building a homemade periscope or kaleidoscope to study reflection and symmetry.
- Demonstration of Bernoulli's principle with air flow experiments (e.g., floating ping pong ball).
- Construction of a simple pendulum and measuring g (acceleration due to gravity).
- Magnetic levitation model using repulsion of magnets.
- Solar Cells and its Fabrication and Testing Processes

Chemistry – Wonders in a Test Tube

Theme: Chemical reactions behind marvels like color changes, crystal formations, and smart materials.

Suggested Experiments/Projects:

- Elephant toothpaste reaction (decomposition of hydrogen peroxide with a catalyst).
- Preparation of chemical garden (metal salt crystal growth in sodium silicate solution).
- Chromatography of plant pigments or ink.
- Creating invisible ink using lemon juice and revealing it with heat.

Biology – Nature's Engineering

Theme: Biological wonders in flora, fauna, and cellular systems.

Suggested Experiments/Projects:

- Extraction of DNA from fruits like banana using household items.
- Observation of capillary action in plants using colored water and celery.
- Creating a model of the human lung using balloons and plastic bottles.
- Studying the effect of natural antiseptics (turmeric, neem) on bacterial growth (using agar plates or bread mold as a proxy).

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Course Code: UMDDDC-406	**Course Title: Marvels of the World**
Credits: 02	**Maximum Marks: 50**
Contact Hours: 15 per credit	**Internal Evaluation: 15**
	External Evaluation: 35

Electronics – Miracles of Modern Technology

Theme: Create basic circuits and smart sensors to understand marvels in consumer electronics.

Suggested Experiments/Projects:

- Building a basic flashlight or touch lamp circuit using LED and resistors.
- Construction of a simple water level indicator.
- Making a burglar alarm system using light sensors (LDR).
- Introduction to Arduino-based weather monitoring system (optional advanced project for interested students).

Pedagogical Approaches:

The course *Marvels of the World* follows a hands-on, inquiry-driven pedagogy that emphasizes learning through direct experimentation and project-based exploration. Students actively engage with natural and technological phenomena across Physics, Chemistry, Biology, and Electronics by designing and performing simple, low-cost experiments that illustrate core scientific principles. The approach encourages collaboration through group projects, fosters creativity and critical thinking through reflective journaling and peer feedback, and promotes scientific literacy even among students from non-science backgrounds. By integrating basic technology and sustainable materials, the course helps students connect theoretical concepts with real-world applications, nurturing problem-solving skills and an appreciation for the science behind everyday marvels.

Mode ofEvaluation:

The evaluation mode for this course will consist of both internal and external assessments, providing a well-rounded approach to student performance.

Internal assessment (15 marks) will be divided into two components: **Technology Analysis (7.5 marks)**, where students will present a report on a technological innovation, analyzing its societal impact and future potential; **Class Participation and Debate (7.5 marks)**, which will evaluate students' involvement in class discussions, debates, and group activities, promoting critical thinking and effective communication skills.

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External assessment (35 marks)will focus on a group-based research project designed to promote collaboration and practical application of course concepts. The assessment will be divided into two components. The first component, the Project Presentation (20 marks), will require each group to present their research findings, demonstrating a clear understanding of the selected topic, application of theoretical concepts, and innovative solutions to a modern technological challenge. The presentation will be evaluated based on clarity, depth of analysis, teamwork, and communication skills. The second component, the Project Report Submission (15 marks), will involve submitting a comprehensive written report detailing the research process, findings, and conclusions. The report will be assessed on the quality of independent research, coherence, structure, and the integration of innovative approaches. This assessment aims to evaluate both the collaborative and analytical capabilities of students while encouraging creative problem-solving.

Recommended Readings:

1. "The Magic of Reality" by Richard Dawkins
   (Explains natural phenomena with clarity and accessible language.)
2. "Science Matters: Achieving Scientific Literacy" by Robert M. Hazen and James Trefil
   (A broad overview of key scientific concepts for non-science majors.)
3. "Six Easy Pieces" by Richard P. Feynman
   (Introductory essays on the fundamentals of physics—light, gravity, motion.)
4. "Fun with Physics" by Louis Bloomfield
   (Explores physics concepts behind everyday experiences.)
5. "The Joy of Chemistry: The Amazing Science of Familiar Things" by Cathy Cobb and Monty L. Fetterolf
   (Engaging stories and demonstrations of chemistry in daily life.)
6. "Chemistry in the Kitchen" by Matthew Hartings
   (Connects chemical principles to cooking and home experiments.)
7. "Biology: A Global Approach" by Neil A. Campbell et al. (Selected chapters)
   (For structured coverage of plant, cell, and system-level biology.)
8. "The Hidden Life of Trees" by Peter Wohlleben
   (Engaging narrative on plant biology and ecosystem dynamics.)
9. "Make: Electronics: Learning by Discovery" by Charles Platt
   (Beginner-friendly guide with hands-on electronics experiments.)
10. "Getting Started with Arduino" by Massimo Banzi
    (Ideal for students trying basic automation and smart sensor projects.)

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Course code: UMDDDA-407

Credit: 04
Contact hours: 15 per credit

Course Title: The Art and Science of Predictions
Maximum marks: 100
Internal Evaluation: 30
External Evaluation: 70

Learning Outcomes: The objectives of the course on "Art and Science of Predictions" include:

- execution of matrix operations and use them to manipulate and analyse data;
- utilizing eigenvalues, eigenvectors, and matrix factorizations in machine learning and data analysis tasks;
- implementation and interpretation of dimensionality reduction techniques like PCA in data science;
- application of statistical methods to real-world problems.
- to foster analytical thinking and problem-solving skills.
- to equip students with tools for data analysis and interpretation.

Prerequisites: Basic knowledge of Calculus and Statistics; Introductory knowledge of programming (Python).

Predictive Foundations – Making Sense of Data with Matrices

Imagine you own a small shop that sells three different types of products. We can represent the sales of last twelve months in the form of rectangular grid where rows represent products and columns represent months. This mathematical entity is called Matrices.

Detailed Content:

a. **The Magic of Matrices:**

   Recall how to add, multiply, and manipulate matrices to uncover hidden insights. Special types of matrices are like secret tools that make calculations easier.

b. **Solving Puzzles with Matrices:**

   Computer use matrices to break them down complex problems into smaller, manageable pieces. We'll explore how to solve systems of equations using simple steps like Gaussian elimination.

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c. The Power of Inverses and Determinants:

Inverses and determinants are like the "undo" buttons and "checkers" of matrices. They help us reverse calculations and understand if a problem has a unique solution.

Hands-On Activities:

i. **Image Processing with Python**
ii. **Finding Redundant Data in Machine Learning**
iii. **Secret Messages with Cryptography**

From Chaos to Clarity: Simplifying Complex Data

Using powerful tools like eigenvalues, eigenvectors, and matrix decompositions, you'll learn how to simplify complex datasets.

Detailed Content:

a. Finding the Hidden Core of Data

Discover how to uncover the most important patterns in your data. These "hidden gems" help simplify complex datasets, making them easier to analyze. (Behind tools like PCA for reducing clutter in data!)

b. Breaking Down Data into Key Insights

Learn how to split messy, complicated data into smaller, meaningful pieces. This technique powers recommendation systems (like Netflix suggestions) and helps spot trends in social media or text.

c. Reshaping Data for Clearer Analysis

Transform raw data into a cleaner, more usable format. Think of it like stretching or rotating a cluttered table to highlight what truly matters—perfect for preparing data for machine learning.

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Hands-On Activities:

i. **Image Recognition with PCA**
ii. **Google's PageRank Algorithm**
iii. **Movie Recommendation System with SVD**

Exploring the Potential of Data for Prediction

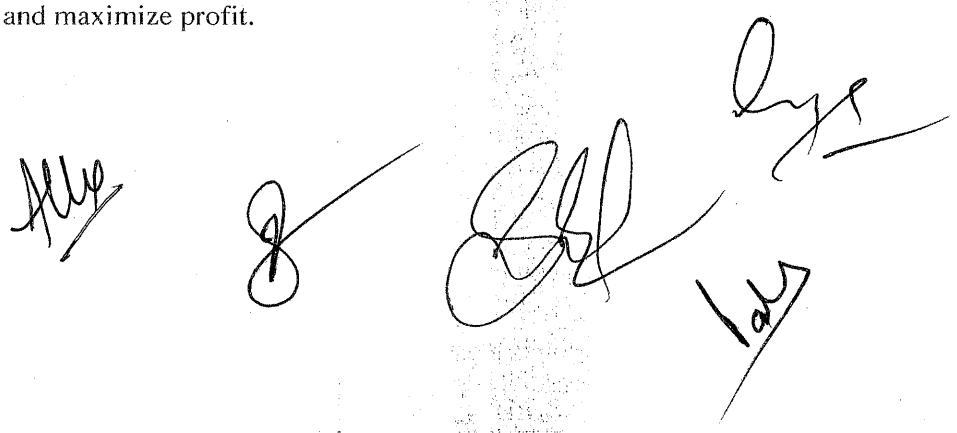
As an example you will learn how to predict **sales revenue**of a small shop where multiple factors influence sales, such as **product prices, marketing efforts, and customer demographics**. These factors exist on different scales, including **nominal, ordinal, interval, and ratio** data. By the end of this module, you will understand how tochoose suitable models, and evaluate performance to make accurate revenue predictions.

Detailed Contents

- To model the relationship by identifying changes in the predictors affect the outcome, which is essential for uncovering cause and effect relationships.
- Simplify complex datasets by grouping variables that are highly correlated, which can reveal hidden patterns and structures.
- To group similar data points together, helping you find natural clusters or patterns within your data.

Forecasting the Future Through times series data

Imagine a bakery tracks daily bread sales for a year to predict future demand. Using time series data, it adjusts production based on trends, holidays, and seasonal patterns to minimize waste and maximize profit.



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Detailed Contents

- Decomposition in time series data separates trend, seasonality, improving forecasting accuracy, decision-making, and resource optimization for better business planning.
- Time series techniques to analyze trends, seasonality, and improving forecasting accuracy, demand prediction, inventory management, and decision-making for optimized business operations and resource allocation.

Hands-On Activities:

Sales Forecasting: Predict future product sales using historical monthly sales data.

Energy Consumption Forecasting: Forecast electricity demand based on past patterns.

Website Traffic Prediction: Predict website visits based on past traffic data to plan marketing or server capacity.

Stock Price Prediction: Use past stock prices to forecast future trends and volatility.

Assessment Methods

1. **Projects**: Real-world data analysis and case studies.
2. **Class Participation**: Interactive sessions and group discussions.

Pedagogy: Mentor must introduce each topic with the help of real-life situations/problems so as to give complete understanding of the concept and enabling the students to find solutions to the problems at their own by "How to Solve it" approach. Mathematical concepts must come to the students in a natural way instead of imposing on them.

Recommended Textbooks

1. **Mathematics**

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Primary Textbook: "Linear Algebra and Its Applications" by Gilbert Strang, Cengage India Private Limited, 2005.

Supplementary Textbooks:

- "Matrix Computations" by Gene H. Golub and Charles F. Van Loan, Johns Hopkins University Press, 2013.
- "Practical linear algebra for data science" by M. X. Cohen, O'Reilly Media, Inc. 2022.

Software: Python (NumPy, pandas, scikit-learn), or R for coding exercises

2. **Statistics**
   - *Mathematical Statistics and Data Analysis, 3rd Edition* by John A. Rice, Cengage India Private Limited, 2013.
   - *The Elements of Statistical Learning: Data Mining, Inference and Prediction, 2nd Edition* by Trevor Hastie, Robert Tibshirani, and Jerome Friedman, Springer, 2017.
3. **Supplementary Materials**
   - Statistical software manuals and online tutorials.
   - Research papers and case studies.

Mode of Evaluation

The assessment structure for this program consists of two components: internal assessment and external assessment. The internal assessment, shall account for 30 per cent of the overall grade, on the basis of continuous performance monitoring through minor projects, group discussions, presentations/tests/quizzes, class participation, team work and 70% of the grade shall be assessed through a Major Project, which will span an entire semester. The evaluation of the major project would be comprehensive, considering various factors like identification of problem, methodology applied, tools used, data analysis and practical implication of the project. The project may involve choosing a specific war/local issue and conduct a detailed analysis of its long-term economic impacts, presenting their findings in a comprehensive research paper and oral presentation.