

## Manonmaniam Sundaranar University, Tirunelveli -12

### List of Supportive Courses through MOOCs for the I year II Semester (2021-22 batch) P G Programmes of the Univ. Depts / Centres

Sl. No.	Name of the Department	Title of the Supp.Courses	Subject Code	Name of the Mentor & Contact Number	Course Type ( $\geq$ 8 weeks)
1.	Animal Science	Introduction On Intellectual Property To Engineers And Technologists	NZOMSE	Dr S. Kalidass Cell :9443022508	8
2.	Biotechnology	Basics of Biology	NBTMSE	Dr. K. Murugan Cell : 9443696309	12
3.	Centre for Information Technology and Engineering (CITE)	Online Privacy	NITMSE	Mrs. P. Kavitha Cell: 9842237101 Mail : kavithasiva2005@gmail.com	12
4.	Centre for Marine Science and Technology (CMST)	Applied Environmental Microbiology	NMBMSE	Dr. M. Michael Babu Cell: 9443731640	12
5.	Centre for Geotechnology	Natural Hazards	NGPMSE	Mr. S. Arunbose Cell : 6380714757	8
6.	Chemistry	Fundamentals of Spectroscopy	NCHMSE	Dr. K. Swarnalatha Mob.: 9994164804 swarnalatha@msuniv.ac.in	12
7.	Commerce	Principles of Management	NCOMSE	Dr.B. Revathy Cell : 9442781692	12
8.	Communication	Introduction to Cultural Studies	NMCMSE	Mr. Gnana D Hans Cell : 9843215597	12
9.	Computer Science and Engineering	Problem Solving Through Programming in C	NCSMSE	Dr.S.Antelin Vijila Cell : 9500026987	12
10.	Criminology and Criminal Justice	Introduction to Research	NCJMSE	Dr. R. Sivakumar Cell : 9486115172	8
11.	Economics	Foundation Course in Managerial Economics	NEOMSE	Dr. G. Monikanda Prasad Cell: 9487403472	8
12.	Education	Emotional Intelligence	NEDMSE	Dr S. R. Sundaravalli Cell : 95434 14963	8

13.	English	Soft Skills Development	NENMSE	Dr. R. Vasuhi Ph: 8870019491	8
14.	History	Indian Government and Politics	NHSMSE	Dr.V. Manikanda Sethupathy Cell : 9488048438	12
15.	Management Studies	Financial Institution and Markets	NMSMSE	Dr. M. Bhoopal Cell: 9788314646	12
16.	Mathematics	Graph Theory	NMAMSE	Mrs. I. Valliammal Mob. No. 9944040258	8
17.	PG- Extension Centre	Enhancing Soft Skills & Personality	NPGMSE	Dr. P. Indu Cell : 9489 500 067 Dr.N.T. Muthuraja Cell : 9486 206 057	8
18.	Physics	Introduction to Laser	NPHMSE	Dr. S. Shailajha Cell : 9566943608	12
19.	Plant Science	Research Methodology	NBYMSE	Dr. A . Selvam Cell :7598551578	12
20.	Psychology	Psychology of Stress, Health and Well-being	NPYMSE	Dr. YUVARAJ T Cell : 9840281992	12
21.	Renewable Energy Science	Waste to energy conversion	NREMSE	Dr. V. Sabarinathan Cell : 7397316464	8
22.	Sri Paramakalyani Centre of Excellence in Environmental Sciences (SPKCES)	Soil Science and Technology	NEVMSE	Dr. R. Soranam Cell : 9486409520	12
		Nanotechnology in Agriculture	NNSMSE	Dr. M. Muralidharan Cell : 9994464630	8
23.	Statistics	Business Statistics	NSTMSE	Dr. R. Sasikumar Cell : 9442025078	12
24.	Sociology	Human Behaviour	NSOMSE	Dr. R. Murugeson Cell :9443617187	8

# Introduction On Intellectual Property To Engineers And Technologists

By Prof. Tapas Kumar Bandyopadhyay | IIT Kharagpur

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**Learners enrolled: 331**

Intellectual Property is key driver of economy. The knowledge over intellectual property is essential for individual to take part in economic development. The course aims to provide basics of various forms of intellectual property. Further the course provides insight of registration procedure of various forms of intellectual property.

**INTENDED AUDIENCE:** Nil.

**PREREQUISITES:** Basic knowledge of technology and awareness to law.

**INDUSTRIES SUPPORT:** R &D of MNC

## Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	8 weeks
Start Date :	21 Feb 2022
End Date :	15 Apr 2022
Exam Date :	24 Apr 2022 IST
Enrollment Ends :	21 Feb 2022
Category :	o Humanities and Social Sciences
Credit Points :	2
Level :	Undergraduate/Postgraduate

This is an AICTE approved FDP course

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## Course layout

**Week 1:** Introduction to IP.

**Week 2:** Patent Basic

**Week 3:** Patent filing procedure

**Week 4:** Copyright basic, Industrial Design, Emerging issue

**Week 5:** Trademark basic, GI basic

**Week 6:** IC Layout Design

**Week 7:** Trade secret

**Week 8:** Comparative analysis, IP management

#### Books and references

1. THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW, William M. LANDES, Richard A. Posner, Harvard University Press, 2003.
2. Intellectual Property and Development: Theory and Practice, Rami M. Olwan, Springer
3. Narayanan, P (2006) Intellectual Property Law. 3rd edition. Eastern Law House
4. Colston, C., Middleton, K. 2004 Modern Intellectual Property Law. 2nd Edition. Cavendish Publishing Ltd
5. Cornish W, Llewelyn, D (2003) Intellectual Property: Patents, Copyrights, Trademarks and Allied rights. Fifth edition. Sweet and Maxwell.
6. William M. Landes & Richard A. Posner, Indefinitely Renewable Copyright, 70 U. CHI. L. REV. Goldstein, Kitch and Perlman, 2006, Selected Statutes and International Agreements on Unfair Competition, Trademark, Copyright, and Patent
7. Paul Goldstein, 2002, Copyright, Patent, Trademark and Related State Doctrines: Cases and Materials on Intellectual Property Law, Revised 5th edition, New York, NY: Foundation Press, 1025 pages.
8. T.K. Bandyopadhyay and Saurabh Bindal, "Introduction to Intellectual Property" 1st edition Eastern Book Company, 2015.

# Basics of Biology

By Prof. Vishal Trivedi | IIT Guwahati

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**Learners enrolled: 1699**

In the current MOOCs course I have put effort to discuss different aspects of biology for engineer graduate students. The course will discuss in detail about human physiology and that will help the student to understand the working principles of different process as well as mechanism of different types of diseases. It will help student to understand the general biology as well as they may be able to integrate their engineer skills to take-up and solve challenging questions related to daily life. By the end of this course, student will be able to understand:

1. Basics of biology and different types of organisms in universe.
2. Understanding different types of cells and their structure and functions.
3. Molecular Cell biology and mechanism of different cellular processes.
4. Human physiology and disease biology.

**INTENDED AUDIENCE:** Any interested learners

**PREREQUISITES:** None.

**INDUSTRY SUPPORT:** Basic course for 1<sup>st</sup> Yr BTech students

## Summary

Course Status :	Upcoming
Course Type :	Core
Duration :	12 weeks
Start Date :	24 Jan 2022
End Date :	15 Apr 2022
Exam Date :	23 Apr 2022 IST
Enrollment Ends :	31 Jan 2022
Category :	<ul style="list-style-type: none"><li>○ Biosciences</li><li>○ Biological Sciences &amp; Bioengineering</li></ul>
Credit Points :	3

Level :	Undergraduate
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#### Course layout

**Week 1:** Introduction to Biology

**Week 2:** Origin of Life and Evolution

**Week 3:** Cells in biology

**Week 4:** Molecules of the Life (Part 1)

**Week 5:** Molecules of the Life (Part 2)

**Week 6:** Basics of Cellular Processes (Part 1)

**Week 7:** Basics of Cellular Processes (Part 2)

**Week 8:** Human Physiology (Part 1)

**Week 9:** Human Physiology (Part 2)

**Week 10:** Human Physiology (Part 3)

**Week 11:** Cellular Homeostasis

**Week 12:** Summary and Conclusions

#### Books and references

##### **Texts:**

1. J. L. Tymoczko, J. M. Berg and L. Stryer, Biochemistry, 8<sup>th</sup> Ed, W. H. Freeman & Co, 2015.
2. D. L. Nelson and M. M. Cox, Lehninger Principles of Biochemistry, 7<sup>th</sup> Ed, Macmillan Worth, 2017.

##### **References:**

1. N. Hopkins, J. W. Roberts, J. A. Steitz, J. Watson and A. M. Weiner, Molecular Biology of the Gene, 7<sup>th</sup> Ed, Benjamin Cummings, 1987.
2. C. R. Cantor and P. R. Schimmel, Biophysical Chemistry (Parts I, II and III), W.H. Freeman & Co., 1980.
3. C. C. Chatterjee, Human Physiology, Vol 1 & 2, 11<sup>th</sup> Ed, Medical Allied Agency, 1987.
4. Hall, B.K., Evolution: Principles and Processes, 1<sup>st</sup> Ed, Jones & Bartlett, 2011.

# Online Privacy

By Prof. Ponnurangam Kumaraguru | IIIT Hyderabad

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## Learners enrolled: 1489

With increase in the usage of the Internet, there has been an exponential increase in the use of online platforms, including social media (Facebook, Twitter, Koo, Tinder), e-commerce (Amazon, Flipkart), gaming (Roblox), video streaming (Netflix, Amazon Prime, Twitch), and messaging (WhatsApp, Signal, Telegram) services. These platforms have changed our way of living, and information that we share with or consume from these platforms. However, widely used, there is a lack of understanding of privacy on these online platforms. Popularity of study of Online privacy as a topic of study is very recent. Online Privacy needs to be investigated, studied and characterized from various perspectives (computational, cultural, psychological, theoretical, etc.). It is critical to understand the threats and defend privacy through real-time and scalable systems. Since there are no logical boundaries for the online space, it is important to study the problem from an international perspective too.

**PRE-REQUISITE** :Any student from 5<sup>th</sup> semester UG B.Tech. should be able to understand the content of the course.

**INDUSTRY SUPPORT** :TCS, Wipro, Microsoft to name a few, any company involved in online business will be interested

**INTENDED AUDIENCE** :Anybody interested in the area of Privacy, including industry professionals and students

### Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	12 weeks
Start Date :	24 Jan 2022
End Date :	15 Apr 2022
Exam Date :	23 Apr 2022 IST
Enrollment Ends :	31 Jan 2022

Category :	o Computer Science and Engineering
Credit Points :	3
Level :	Undergraduate/Postgraduate
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### Course layout

- Week 1:** Introduction; Various Privacy breaches, and its effects; Why Online privacy has become an important topic?; Privacy cases / litigations, and outcomes
- Week 2:** Definition & forms of Privacy; Difference between data security & data privacy; Trade-off between privacy and freedom of speech; Trade-off between privacy and utility; Contextual integrity theory and applications
- Week 3:** Privacy Attitudes & Awareness
- Week 4:** Social Media Privacy
- Week 5:** Social Media Privacy
- Week 6:** Data anonymity; K-anonymity, L-diversity, T-closeness, Differential privacy
- Week 7:** Image & Location privacy; Ethics about studying online privacy: Institutional Review Board / Ethics Committee; Conducting {User, Lab, and Online} Studies; Privacy from 3rd party trackers & advertisers
- Week 8:** Image & Location privacy; Ethics about studying online privacy: Institutional Review Board / Ethics Committee; Conducting {User, Lab, and Online} Studies; Privacy from 3rd party trackers & advertisers
- Week 9:** User behaviour & Usable privacy; Privacy in National projects like Aadhaar, NATGRID; Differential privacy in US census, Apple; PDP Bill / Srikrishna commission report / GDPR: Implications
- Week 10:** User behaviour & Usable privacy; Privacy in National projects like Aadhaar, NATGRID; Differential privacy in US census, Apple; PDP Bill / Srikrishna commission report / GDPR: Implications
- Week 11:** Privacy policies: Length, readability, legality, cost of reading privacy policies; Nutrition labels of Privacy policies: How to make the policies simple and user friendly
- Week 12:** Privacy policies: Length, readability, legality, cost of reading privacy policies; Nutrition labels of Privacy policies: How to make the policies simple and user friendly

### References:

All necessary materials will be shared with students on slides, online materials



# Applied Environmental Microbiology

By Prof. Gargi Singh | IIT Roorkee

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**Learners enrolled: 957**

This course prepares the student to address pressing environmental challenges by developing a fundamental understanding of the microbial communities and processes in natural and built environments. It lays and builds upon the foundation of basic microbiology, microbial energetics, and diversity, to applying tools provided by microbiology ranging from traditional to state of art for addressing relevant environmental concerns. It provides an indepth exploration of the diverse role microbes and microbial communities and includes topics such as: cell structure and elements, microbial energetics and diversity, ecology and population dynamics, environmental microbial processes including biogeochemical cycling, and microbes involved in biodeterioration and bioremediation.

**INTENDED AUDIENCE** : Students of Civil Engineering, Chemical Engineering, and related sciences, It is an elective course for UG students.

**PREREQUISITES** : NIL

**INDUSTRY SUPPORT** : Water and waste water treatment companies such as VA Tech Wabad GMBH, Thermax India, GE Water, Siemens Water, SFC Environmental Technologies Pvt. Ltd., Voltas Ltd.; Biotechnological companies such as: Bharat Biotech International, Biocon, Biotech Consortium India Ltd;Bioremediation companies such as ONGC Teri Biotech Ltd, Chempure Technologies; CPCB, Department of Irrigation and Public Health.

## Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	12 weeks
Start Date :	24 Jan 2022
End Date :	15 Apr 2022
Exam Date :	23 Apr 2022 IST
Enrollment Ends :	31 Jan 2022

Category :	<ul style="list-style-type: none"> <li>○ Civil Engineering</li> <li>○ Environment</li> </ul>
Credit Points :	3
Level :	Postgraduate

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### Course layout

**Week 1 :** Introduction; cell elements and composition Cell and its composition, cytoplasmic membrane Prokaryotic cell division Microbes and their environmental niches Historical roots of microbiology Nucleic acids and amino acids DNA structure, replication, and manipulation Protein and its structure Regulation Microbial nutrition Microscopy: Light microscopy, 3D Imaging, AFM, Confocal scanning laser microscopy

**Week 2 :** Microbial energetics and diversity Stoichiometry and bioenergetics Oxidation-reduction NAD, energy-rich compounds and energy storage Mathematics of microbial growth Glycolysis Respiration Citric-acid cycle Catabolic Alternatives Phototrophy, Chemolithotrophy, anaerobic respiration (Nitrate and Sulfate reduction; Acetogenesis; Methanogenesis; Metal, Chlorate, and organic electron acceptors)

**Week 3 :** Microbial metabolism and functional diversity of bacteria Prokaryotic diversity Classical taxonomy Origin of life Tree of life Major catabolic pathways Catalysis and enzymes Energy conservation Sugars and polysaccharides, amino acids, nucleotides, lipids

**Week 4 :** Microbial ecosystems Population, guilds, and communities Environments and microenvironments Microbial growth on surfaces Environmental effects on microbial growth

**Week 5 :** Environmental genomics and microbial ecology; genetic exchange Environmental genomics Microbial ecology Horizontal and vertical gene transfer: Replication, Transformation Transduction

**Week 6 :** Microbial symbiosis and virus, Mutation and its rate ,Genetic recombination, Population dynamics ,Virus ,Viroid, Prion ,Application of environmental microbes

**Week 7 :** Investigations in environmental microbiology: sampling, detection, isolation, taxonomic and functional annotation and quantification; Introductory bioinformatics and data analysis Microbial sampling Culture based and culture independent tools Molecular biology tools: Cloning, amplification, sequencing,Case study

**Week 8 :** Bioremediation and wastewater microbiology, Bioremediation and examples, Acid mine drainage, Enhanced metal recovery, Wastewater microbiology

**Week 9 :** Drinking water microbiology, Drinking water microbiome and treatment, Microbial instability ,Water borne microbial diseases

**Week 10 :** Solid waste microbiology and antimicrobial resistance, Landfills, Leachate, Anaerobic degradation phases, Antimicrobial resistance

**Week 11:** Epidemiology and biosensors ,Public health, Epidemics, Biosensors ,Wearable biosensors

**Week 12 :** Built microbiology, exposomes and bioinformatics, Exposure routes ,Microbes living around us ,Exposomes Basic bioinformatics, Bioinformatics tools available online

#### Books and references

1. Bruce E. Rittmann, and Perry L. McCarty. Environmental Biotechnology: Principles and Applications. McGraw-Hill, 2001. ISBN: 0071181849. 2017.
2. Madigan, M., Bender K. S., Buckley D.H., Sattley W. M., and Stahl D.A.. Brock Biology of Microorganisms. 15th ed. New York: Pearson, 2017. ISBN: 0134261925. 2001.

# Natural Hazards

By Prof. Javed N. Malik | IIT Kanpur

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## Learners enrolled: 714

The course introduces students to natural disasters and their phenomenon, ground deformations, land-level changes, event recurrence intervals, associated environmental and depositional changes, sedimentation patterns, and all the related hazards. Some of the well-known natural disasters are earthquakes, landslides, floods, tsunamis, volcanic eruptions, storms, and cyclones etc. which cause different types of natural hazards in the associated environment and landscape. This course will emphasize their mechanism, origin, and impacts in the associated regions such as mainland, hilly terrain, floodplain/alluvial plain, and coastal regions etc., and also focus on the approaches for mitigating and minimizing hazards along with related hazard assessment.

**INTENDED AUDIENCE :** PG students of Science and Engineering, Advance UG students too can take this course.

**PREREQUISITES :**Basic knowledge of Earth Science or Natural Disasters is recommended.

**INDUSTRY SUPPORT :** NIL

### Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	8 weeks
Start Date :	24 Jan 2022
End Date :	18 Mar 2022
Exam Date :	27 Mar 2022 IST
Enrollment Ends :	31 Jan 2022
Category :	o Civil Engineering
Credit Points :	2
Level :	Postgraduate

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#### Course layout

**Week 1** : Natural Hazards and Disasters ,Natural Hazards and Disasters ,Human Impact on Natural Disaster, Predicting Catastrophe Mitigating Hazards

**Week 2** : Mitigating Hazards,Plate Tectonics and related Hazards,Plate Tectonics and related Hazards,Plate Tectonics and related Hazards,Earthquakes and their causes

**Week 3** : Earthquakes and their causes,Earthquakes and their causes,Ground Motion and Failures,Ground Motion and Failures Ground Motion and Failures

**Week 4** : Tsunami: Gaint Tsunamis,Tsunami: Gaint Tsunamis ,Tsunami: Generation and Movement,Tsunami: Generation and Movement,Tsunami: Generation and Movement

**Week 5** : Tsunami Hazard Assessment,Tsunami Hazard Assessment,Volcanic Hazard: Eruption-Type of Volcanoes and Tectonic environment,Volcanic Hazard: Eruption-Type of Volcanoes and Tectonic environment,Volcanic Hazard: Eruption-Type of Volcanoes and Tectonic environment

**Week 6** : Landslide and their causes, Type of downslope movement, associated hazard,Landslide and their causes, Type of downslope movement, associated hazard,Landslide and their causes, Type of downslope movement, associated hazard,Land Subsidence and associated hazard,Land Subsidence and associated hazard

**Week 7** : Floods and Human Interaction,Flood Frequency and Recurrence Interval,Flood Frequency and Recurrence Interval,Human intervention and mitigation,Human intervention and mitigation

**Week 8** : Storms: Tropical Cyclone,Storms: Tropical Cyclone,Hurricane, Tornado, Storm damage and safety,Wildfires: Fire Process and Secondary effects,Wildfires: Fire Process and Secondary effects.

#### Books and references

Monroe, J. S., Wicander, R., and Hazlett, R. (2007). Physical Geology: Exploring the Earth. Sixth Edition. Page 690. • Strahler, A. Introduction to Physical Geology. Pub. John Wiley & Sons, Inc. page 632. • Hyndman, D., and Hyndman, D. (2011). Natural Hazards and Disasters. Third Edition. Pages 571. • Keller, E. D. (2012). Introduction to Environmental Geology. Printice Hall. Page 801.

# Fundamentals of Spectroscopy

By Prof. Sayan Bagchi, Prof. Anirban Hazra | NCL Pune, IISER Pune

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**Learners enrolled: 601**

Spectroscopy is the study of the interaction of light (electromagnetic radiation) with matter. Electromagnetic radiation covers a wide range of frequencies from gamma rays to radio frequencies. Depending on the frequency of radiation interacting with the matter, one can have different forms of spectroscopy. These spectroscopic techniques allow us to monitor the structural properties of matter. For example, information on moment of inertia (and hence bond length) can be obtained from rotational spectrum. Similarly, vibrational spectrum provides information on the force constant, i.e. the strength of a chemical bond. Besides providing information on molecular structure, spectroscopic techniques can also be used for quantitative estimation of a substance making spectroscopy an important analytical tool. Further, a spectroscopic transition is characterized by a definite timescale and this can provide information on molecular dynamics. In this course, the fundamental principles of the different forms of spectroscopy will be elaborated in a unified way from both theoretical and experimental viewpoints. Application of these different spectroscopic methods for the elucidation of molecular structure will also be discussed. The structural and dynamic aspects of spectroscopy are fundamental to physics, chemistry and biology. Thus, this course will provide a thorough conceptual understanding for these branches of science.

**INTENDED AUDIENCE :** Interested Learners

**PREREQUISITES :** NIL

**INDUSTRY SUPPORT :** It is a basic course. Therefore it is not directly relevant for industrial application

## Summary

Course Status :	Upcoming
Course Type :	Core
Duration :	12 weeks
Start Date :	24 Jan 2022
End Date :	15 Apr 2022
Exam Date :	24 Apr 2022 IST
Enrollment Ends :	31 Jan 2022

Category :	o Chemistry
Credit Points :	3
Level :	Undergraduate

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#### Course layout

**Week 1:** Interaction between Light and Matter

**Week 2:** Different Forms of Spectroscopy

**Week 3:** Rotational Spectroscopy

**Week 4:** Rotational Spectroscopy

**Week 5:** Vibrational Spectroscopy

**Week 6:** Vibrational Spectroscopy

**Week 7:** Raman Spectroscopy

**Week 8:** Raman Spectroscopy

**Week 9:** Electronic Spectroscopy

**Week 10:** Electronic Spectroscopy

**Week 11:** Electronic Spectroscopy

**Week 12:** Combination of different spectroscopic methods to solve complex problems

#### Books and references

1. Introduction to Molecular Spectroscopy by Gordon M Barrow, McGraw-Hill Inc. US
2. Molecular Spectroscopy by Ira N Levine, Wiley
4. Fundamentals of Molecular Spectroscopy, Colin N. Banwell & Elaine M. McCash, McGraw Hill Education
3. Modern Spectroscopy by J. Michael Hollas, Wiley-Blackwell
5. Fundamentals of Molecular Spectroscopy, P S Sindhu, New Age International Publishers.

# Principles of Management

By Prof. Usha Lenka | IIT Roorkee

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**Learners enrolled: 2611**

The course provides an overview of management and its evolution. It examines management functions of planning, organizing, leading, and controlling and its impact on the business organization. It discusses necessary skills and functions required for efficient manager in contemporary business environment. Overall, it enables students to analyze and understand changing business environment, and the role of ethics, social responsibility and environmental issues in contemporary business environment.

**INTENDED AUDIENCE :** All Graduates (Management, Engineering, Sciences, Arts)

**PREREQUISITES :** None

**INDUSTRIES SUPPORT :** Infosys, TATA, Relaince, Public Sector Companies like BHEL, SAIL, ONGC etc.

## Summary

Course Status :	Upcoming
Course Type :	Core
Duration :	12 weeks
Start Date :	24 Jan 2022
End Date :	15 Apr 2022
Exam Date :	23 Apr 2022 IST
Enrollment Ends :	31 Jan 2022
Category :	<ul style="list-style-type: none"><li>○ Management Studies</li><li>○ Minor in Management</li></ul>
Credit Points :	3



Level :	Undergraduate/Postgraduate
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### Course layout

**Week 1:** Introduction to Management: Management – An Emerging Profession, Definition, Nature, Scope, Purpose, and characteristics of Management, Functions, roles, skills of an effective Manager

**Week 2:** Evolution of Management Thought : Classical Theory, Scientific Management , Management Process or Administrative Management, Bureaucracy, Behavioural Science Approach, Quantitative Approach, Systems Approach, Contingency Approach, Operational Approach

**Week 3:** Planning: Types of Plans, Planning Process, Introduction to Strategic Management, Types of Strategies, Understanding environment of business: Environmental appraisal – Industry Analysis - Porter’s Model of competitive advantage, analysis of organisational resources and capabilities

**Week 4:** Forecasting and Premising : Introduction to Forecasting, Essential Components in Business Forecasting, Determinants of Business Forecasts, Benefits of Forecasting, Techniques of Forecasting, Limitations of Forecasting

**Week 5:** Decision-making : Introduction, Components of Decision-making, Decision-making Process, Group Decision-making, Creativity Problem-solving

**Week 6:** Management by Objectives and Styles of Management : Core Concepts of MBO, Characteristics of Management by Objectives, Process of MBO, Defining the Goal, Action Plan, Final Review, Benefits of Management by Objectives, Limitations of Management by Objectives, Styles of Management, American Style of Management, Japanese Style of Management, Indian Style of Management

**Week 7:** Organizing and Directing: Introduction, Organizational Design, Hierarchical Systems , Organization Structure, Types of Organization Structure, Formal and Informal Organization, Factors Determining Span of Management, Centralization and Decentralization, Span of control, Understanding authority and responsibility, Principles of Delegation, Authority, Developing a culture of Innovation and performance

**Week 8:** Staffing and Coordination: Introduction, Human Resource Management, Recent Trends in HRM, Technology in HRM, Economic Challenges, Workforce Diversity, Concept of Coordination, Need for Coordination, Importance of Coordination, Principles of Coordination, Coordination Process, Types of Coordination, Issues and Systems Approach to Coordination, Techniques of Coordination

**Week 9:** Career Development Strategy: Introduction, Concept and Elements of Career, Overview of Career Development, Significance and Advantages of Career Development, Objectives of Career Development, Types of Career Development Programmes, Different Stages or Cycles of Career Development Process, Career Anchors, Steps in the Career Planning Process

**Week 10:** Leadership styles of Managers: Leadership Concept, Nature, Importance, Attributes of a leader, Role of a leader in demonstrating awareness of legal, personnel, and strategic issues

relating to globalization, culture and gender diversity in an organization, Role of leader in conflict resolution and negotiations

**Week 11:** Organizational Communication: Communication in Organizations: Introduction, Importance of Communication in the Workplace; Understanding Communication Process, Barriers to Communication, Use of tone, language and styles in Communication, Role of Perception in influencing communication, Role of culture in communication

**Week 12:** Change management: Concept of change, change as a natural process, Importance & Causes of change – social, economic, technological, organizational, Developing a climate for learning, Concept of learning organizations

Challenges of Contemporary Business: Role of Ethics, Corporate social responsibility, and environmental issues

#### Books and references

1. Stephen P. Robbins, David A. Decenzo, 2016. Fundamentals of Management, Pearson Education, 9th Edition
2. Harold Koontz, O'Donnell and Heinz Wehrich, 2012. Essentials of Management. New Delhi, 9th edition, Tata McGraw Hill
3. Management Fundamentals: Concepts, Applications, & Skill Development, 6th edition, Sage. 2014
4. Richard L. Daft, Principles Of Management, Cengage Learning. 2009
5. Robbins, Management, 9th edition Pearson Education. 2008

# Introduction to Cultural Studies

By Prof. Avishek Parui | IIT Madras

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## Learners enrolled: 370

This course intends to examine culture, cultural identities and politics of production across various human historical conditions. Culture is examined in this course as an asymmetrical entanglement of material and abstract attributes and hence the course draws on political theory, psychology and critical theory, among other disciplines, in order to investigate the constructed categories of identity, authority and knowledge.

**INTENDED AUDIENCE** : B.A/M.A. students of English and Cultural Studies

**PRE-REQUISITES** : B.A in English or Cultural Studies I

**INDUSTRY SUPPORT** :NIL

### Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	12 weeks
Start Date :	24 Jan 2022
End Date :	15 Apr 2022
Exam Date :	24 Apr 2022 IST
Enrollment Ends :	31 Jan 2022
Category :	<ul style="list-style-type: none"><li>○ Humanities and Social Sciences</li><li>○ English Studies</li></ul>
Credit Points :	3
Level :	Postgraduate

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## Course layout

**Week 1** : What is Culture? Culture and Cultural Identities, Values, Key lenses for Culture Studies

**Week 2** : Edward Said's Orientalism, Homi Bhabha's 'The Other Question'

**Week 3** : Homi Bhabha's 'The Other Question', George Orwell's 'Shooting an Elephant'

**Week 4** : George Orwell's 'Shooting an Elephant', Lyotard's The Postmodern Condition

**Week 5** : Lyotard's The Postmodern Condition, Frantz Fanon's Black Skin White Masks

**Week 6** : Frantz Fanon's Black Skin White Masks, Judith Butler's Gender Trouble

**Week 7** : Judith Butler's Gender Trouble, Hannah Arendt's The Human Condition

**Week 8** : Hannah Arendt's The Human Condition, Michel Foucault's 'What is an Author?'

**Week 9** : Michel Foucault's 'What is an Author?', Ian Hacking's The Social Construction of What?

**Week 10** : Ian Hacking's The Social Construction of What?, bell hooks' 'Understanding Patriarchy'

**Week 11** : bell hooks' 'Understanding Patriarchy', Slavoj Zizek's Welcome to the Desert of the Real

**Week 12** : Slavoj Zizek's Welcome to the Desert of the Real, Conclusion to the Course

## Teaching Assistants:

1.Soham Chakraborty

2.Nishtha Pandey

## Books and references

Edward Said's Orientalism, Homi Bhabha's 'The Other Question', Frantz Fanon's Black Skin White Masks, Judith Butler's Gender Trouble, George Orwell's 'Shooting an Elephant', Lyotard's The Postmodern Condition, Hannah Arendt's The Human Condition, Michel Foucault's 'What is an Author?', Ian Hacking's The Social Construction of What?, bell hooks' 'Understanding Patriarchy', Slavoj Zizek's Welcome to the Desert of the Real

# Problem Solving Through Programming In C

By Prof. Anupam Basu | IIT Kharagpur

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**Learners enrolled: 6186**

This course is aimed at enabling the students to

- Formulate simple algorithms for arithmetic and logical problems
- Translate the algorithms to programs (in C language)
- Test and execute the programs and correct syntax and logical errors
- Implement conditional branching, iteration and recursion
- Decompose a problem into functions and synthesize a complete program using divide and conquer approach
- Use arrays, pointers and structures to formulate algorithms and programs
- Apply programming to solve matrix addition and multiplication problems and searching and sorting problems
- Apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration

**INTENDED AUDIENCE** : BE/BTech in all disciplines BCA/MCA/M. Sc

**INDUSTRY SUPPORT** : All IT Industries

## Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	12 weeks
Start Date :	24 Jan 2022
End Date :	15 Apr 2022
Exam Date :	23 Apr 2022 IST
Enrollment Ends :	31 Jan 2022

Category :	o Computer Science and Engineering
Credit Points :	3
Level :	Undergraduate/Postgraduate
This is an AICTE approved FDP course	
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### Course layout

**Week 1 :** Introduction to Problem Solving through programs, Flowcharts/Pseudo codes, the compilation process, Syntax and Semantic errors, Variables and Data Types

**Week 2 :** Arithmetic expressions, Relational Operations, Logical expressions; Introduction to Conditional Branching

**Week 3 :** Conditional Branching and Iterative Loops

**Week 4 :** Arranging things : Arrays

**Week 5 :** 2-D arrays, Character Arrays and Strings

**Week 6 :** Basic Algorithms including Numerical Algorithms

**Week 7 :** Functions and Parameter Passing by Value

**Week 8 :** Passing Arrays to Functions, Call by Reference

**Week 9 :** Recursion

**Week 10 :** Structures and Pointers

**Week 11 :** Self-Referential Structures and Introduction to Lists

**Week 12 :** Advanced Topics

### Books and references

#### Textbooks:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

#### Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

# Introduction to Research

By Prof. Edamana Prasad, Prof. Prathap Haridoss | IIT Madras

[Join](#)

## Learners enrolled: 1455

Large numbers of students are actively considering and taking up research and associated higher studies. This course aims to introduce students to the important aspects of research. The intent of the course is to make students aware of the details associated with formal research and to help students overcome common misconceptions that may be present in their minds. By going through this course, students are likely to be able to take up research activities in a more systematic and formal manner right from the beginning.

**INTENDED AUDIENCE** : Students of ME/MTech/MS/MSc/PhD can benefit.

**PRE-REQUISITES** : Students who have completed undergraduate studies (in Engineering or Science) will be in a better position to benefit from this course

**INDUSTRY SUPPORT** : Nil

### Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	8 weeks
Start Date :	21 Feb 2022
End Date :	15 Apr 2022
Exam Date :	23 Apr 2022 IST
Enrollment Ends :	21 Feb 2022
Category :	<ul style="list-style-type: none"><li>○ Multidisciplinary</li><li>○ Faculty Domain - Fundamental</li></ul>
Credit Points :	2
Level :	Postgraduate

This is an AICTE approved FDP course

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## Course layout

**Week 1** : A group discussion on what is research; Overview of research;

**Week 2** : Literature survey , Experimental skills;

**Week 3** : Data analysis, Modelling skills;

**Week 4** : Technical writing; Technical Presentations; Creativity in Research

**Week 5** : Creativity in Research; Group discussion on Ethics in Research

**Week 6** : Design of Experiments

**Week 7** : Intellectual Property

**Week 8** : Department specific research discussions

## Books and references

Nil



# Foundation Course in Managerial Economics

By Prof. Barnali Nag | IIT Kharagpur

[Join](#)

## Learners enrolled: 912

This course is developed to teach modern microeconomic theory to understand the behavior of household, firms and their interaction under different market structure. The purpose of this course is to provide students with a basic understanding of economic theory that can be used in managerial decision making problems within various organizational settings such as a firm or a government agency. Objective is to develop a good understanding of economic concepts and tools that have direct managerial applications.

**INTENDED AUDIENCE**

: Any Interested Learners

**PREREQUISITES**

: Basic Algebra and Calculus

**INDUSTRY SUPPORT**

: Public Policy organizations, Banks, Managerial levels in

all Industries.

## Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	8 weeks
Start Date :	24 Jan 2022
End Date :	18 Mar 2022
Exam Date :	27 Mar 2022 IST
Enrollment Ends :	31 Jan 2022
Category :	o Management Studies
Credit Points :	2
Level :	Undergraduate/Postgraduate

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## Course layout

**Week 1:** Introduction, Demand and Supply.

**Week 2:** Elasticity of demand and supply.

**Week 3:** Government intervention and efficiency.

**Week 4:** Producer theory and cost curves.

**Week 5:** Market structures and perfect competition.

**Week 6:** Monopoly and histogram images.

**Week 7:** Monopolistic competition

**Week 8:** Oligopoly

## Books and references

NIL

# Emotional Intelligence

By Prof. Rabindra Kumar Pradhan | IIT Kharagpur

[Join](#)

## Learners enrolled: 3248

“Intelligence quotient (IQ) gets you hired but emotional quotient (EQ) gets you promoted”. This popular quote by Times magazine during late nineties has made the concept of emotional intelligence more popular among people by highlighting its multiple implications and applications. The uses and utility of emotional intelligence at home, school and workplace have benefited thousands in many disciplines. This course is designed to sensitize the participants about the concept, theory and applications of emotional intelligence. The participants will get to know the added advantage of EQ the software of the brain over the hardware (EQ). This programme will also explore how our hearts rule over our heads for creative creation. It will also focus on how various principles of emotional intelligence guide us in different contexts of life. The awareness about the credo of emotional intelligence will develop insights into self-regulation and realization of one’s optimum potentials for better performance. The participants will come to know about many unknowns of life, which will further help them to enhance their awareness to be effective on their roles. The course will offer useful lessons with the help of practical exercises, games, audio-visual instruments, case studies, classroom interaction to show the road map how to foster emotional intelligence in organisation for achieving health, happiness and optimal performance at work.

**INTENDED AUDIENCE** : Engineering, Management, Social Sciences and Law students

**PREREQUISITES** : NIL

**INDUSTRY SUPPORT** : Human resource management division, training & development division of both manufacturing and service industries, MBA and HRM students

## Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	8 weeks
Start Date :	24 Jan 2022
End Date :	18 Mar 2022
Exam Date :	27 Mar 2022 IST
Enrollment Ends :	31 Jan 2022

Category :	○ Humanities and Social Sciences
Credit Points :	2
Level :	Undergraduate/Postgraduate
This is an AICTE approved FDP course	
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### Course layout

**Week 1:** Introduction to emotion, intelligence & wisdom

**Week 2:** Concept, theory, measurement and applications of intelligence

**Week 3:** Emotional intelligence: concept, theory and measurements

**Week 4:** Correlates of emotional intelligence

**Week 5:** Emotional intelligence, culture, schooling and happiness

**Week 6:** For enhancing emotional intelligence EQ mapping

**Week 7:** Managing stress, suicide prevention, through emotional intelligence, spirituality and meditation

**Week 8:** Application of emotional intelligence at family, school and workplace

### Books and references

NIL

# Soft Skill Development

By Prof. Priyadarshi Patnaik, Prof. V.N. Giri, Prof. D. Suar | IIT Kharagpur

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## Learners enrolled: 4759

While hard skills teach us what to do, soft skills tell us how to apply our hard skills in a social environment. The focus of the course is to develop a wide variety of soft skills starting from communication, to working in different environments, developing emotional sensitivity, learning creative and critical decision making, developing awareness of how to work with and negotiate with people and to resolve stress and conflict in ourselves and others.

The uniqueness of the course lies in how a wide range of relevant issues are raised, relevant skills discussed and tips for integration provided in order to make us effective in workplace and social environments. The key areas addressed are conversation skills, group skills, persuasion skills, presentation skills, critical and creative thinking, emotional skills, positive thinking and vocational skills.

**INTENDED AUDIENCE :** For anyone keen to improve her soft skills, Elective Course, Open course (UG and PG), No restrictions, ideally after class XII

**PREREQUISITES :** Basic knowledge in communication and a good understanding of English

**INDUSTRY SUPPORT :** All industries where soft skills are important will recognize the relevance of this course

### Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	8 weeks
Start Date :	24 Jan 2022
End Date :	18 Mar 2022
Exam Date :	27 Mar 2022 IST
Enrollment Ends :	31 Jan 2022
Category :	o Humanities and Social Sciences

Credit Points :	2
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Level :	Undergraduate/Postgraduate
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Course layout

**Week1:** Communication skills 1: The basics

**Topics to be covered:**

- i. Understanding the communicative environment-I
- ii. Understanding the communicative environment-II
- iii. What to listen for and why
- iv. When to speak and how
- v. Starting and sustaining a conversation

**Week 2:**

Communication skills 2 : Presentation and interaction

**Topics to be covered:**

- i. What to present and how – I
- ii. What to present and how – II
- iii. Multimedia presentation: Understanding the basics
- iv. Communication styles
- v. Speaking in groups

**Week 3:**

Communication skills 3: Visual, nonverbal and aural communication

**Topics to be covered:**

- i. The world of visual culture
- ii. Visual perception
- ii. The aural: Its relevance and impact
- iv. The body and the way it communicates
- v. The face, its expressions and what it says

**Week 4:**

Interpersonal communication 1: Individuals, groups and cultures

- i. Building Relationships
- ii. Understanding Group Dynamics- I
- iii. Understanding Group Dynamics- II
- iv. Groups, Conflicts and their Resolution
- v. Social Network, Media and Extending Our Identities

**Week5:**

Interpersonal communication 2: Emotional and social skills

**Week6:**

Developing key traits 1: Creativity, critical thinking and problem solving

**Week 7:**

Developing key traits 2: Motivation, persuasion, negotiation and leadership

- i. Motivating oneself
- ii. The art of persuasion-I
- iii. The art of persuasion-II
- iv. From persuasion to negotiation
- v. Leadership and motivating others

**Week 8:**

Essential and vocational skills: survival strategies

- i. Managing time
- ii. Managing stress
- iii. Resilience
- iv. Work-life balance
- v. Applying soft-skills to workplace

Books and references

NIL

# Indian Government & Politics

By Arundhati Bhattacharya | University of Burdwan

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## Learners enrolled: 552

This course focuses in detail on the political processes and the actual functioning of the political system. It simultaneously studies in detail the political structure-both constitutional and Administrative. In doing this it elaborately deals with the three wings of governance, namely the Legislative, the Executive, and the Judiciary. This course also emphasizes on local influences that derive from social stratification of castes and *jatis*, from language, religion, ethnic and economic determinants and critically assesses its impact on political processes. The major contradictions of the Indian Political process are to be seriously analyzed along with as assessment of their successes and failures.

## Summary

Course Status :	Upcoming
Course Type :	Core
Duration :	12 weeks
Start Date :	10 Jan 2022
End Date :	31 Mar 2022
Exam Date :	
Enrollment Ends :	28 Feb 2022
Category :	o Humanities and Social Sciences
Credit Points :	4
Level :	Undergraduate

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## Course layout

Week -1

Module-1- Historical Context of Constituent Assembly

Module-2- Composition and Functions of Constituent Assembly

Module-3- Critical Evaluation of Constituent Assembly



Week-2

Module-4- Basic Features of Indian Constitution

Module-5- Preamble to the Constitution of India

Module-6- Introduction to Fundamental Rights

Week-3

Module-7- Right to Equality

Module-8- Right to Freedom

Module-9- Constitutional Status of Some Basic Democratic Rights

Week-4

Module-10- Right against Exploitation

Module-11- Right to Freedom of Religion

Module-12- Right to Constitutional Remedies

Week -5

Module-13- Directive Principles of State Policy & Fundamental Duties

Module-14- President of India

Module-15- Powers and Functions of the President

Module-16- Emergency Powers and the Position of the President

Week -6

Module-17- Union Council of Ministers

Module-18- Prime Minister

Module-19- Rajya Sabha

Module-20- Lok Sabha

Week -7

Module-21- Relation between Lok Sabha & Rayja Sabha

Module-22- Speaker

Module-23- Legislative Procedures of the Parliament

Module-24- Parliamentary Committees

Week -8

Module-25- The Structure and Organization of the Judiciary & the High Court

Module-26- Supreme Court

Module-27- Role of the Supreme Court

Module-28- Judicial Activism in India

Week -9

Module-29- Basic Structure Doctrine & PIL

Module-30- Centre-State Legislative Relations

Module-31- Centre-State Administrative Relations

Module-32- Centre-State Financial Relations

Week -10

Module-33- Evolution of Political Parties

Module-34- National Political Parties

Module-35- Role of Regional Parties

Module-36- Caste in Politics (Part 1)

Week -11

Module-37- Caste in Politics (Part 2)

Module-38- Religion in Politics in India ( Part A)

Module-39-: Religion in Politics in India ( Part B)

Module-40- Politics of Language in India

Week -12

Module-41- Politics of Regionalism in India (Part A)

Module-42- Politics of Regionalism in India (Part B)

Module-43- Introduction to Poverty Alleviation

Module-44- Poverty Alleviation Programmes

#### Books and references

1. Bipan Chandra, Mridula Mukherjee, and Aditya Mukherjee; 'India Since Independence'; Revised Edition, Penguin Books India, 2008.
2. Durga Das Basu; 'Introduction to The Constitution of India'; PHI, Pp.14-19, 1997.
3. Pandey, J.N.; "The Constitution of India, Central Law Agency"; Allahabad, 2010.
4. Pylee, M.V.; 'Constitutional Amendments in India'; Delhi : Universal Law, 2003.
5. Chakrabarty, Bidyut (ed.); 'Centre-State Relations in India'; New Delhi, Segment, 1990.
6. Quraishi Zaheer Masood; "Struggle for Rastrapati Bhawan: A study of Presidential elections"; Delhi, Vikas 1973.
7. Jain H.M; "The Union Executive"; Allahabad, Chaitanya Publishing House, 1969.
8. Morris Jones & Wyndraeth Humphreys; "Parliament in India"; London, Longmans, Green, 1957.
9. Chakrabarti Bidyut; "Indian government and politics"; New Delhi, Sage, 2008.
10. Madan, T.N., 'Secularism in its place', The Journal of `Asian Studies, Vol. 46, No.4, 1987.

# Financial Institutions and Markets

By Prof. Jitendra Mahakud | IIT Kharagpur

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## Learners enrolled: 952

This course will provide an understanding of the functions, and operations of the financial markets and institutions operating in India. It explains the role of financial system on economic development. Various conceptual issues related to risk and return, the role of regulatory bodies, mechanism of commercial banking, operations of insurance companies and mutual funds are discussed elaborately. It also describes the importance of small savings, provident funds, pension funds and credit rating agencies. The course provides a comprehensive overview and systematic evaluation of the mainstream markets of various financial instruments such as call money, bond, stock, derivatives and exchange rate.

**INTENDED AUDIENCE :** Economics, Commerce and MBA Finance

**PREREQUISITES :** None

**INDUSTRY SUPPORT :** Financial Consulting Companies, Regulatory Bodies like RBI, SEBI, IRDA, PFRDA

### Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	12 weeks
Start Date :	24 Jan 2022
End Date :	15 Apr 2022
Exam Date :	24 Apr 2022 IST
Enrollment Ends :	31 Jan 2022
Category :	o Management Studies
Credit Points :	3
Level :	Undergraduate/Postgraduate

This is an AICTE approved FDP course

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## Course layout

- Week 1** : Introduction to Financial System and Economic Development  
Indicators of Financial Development
- Week 2** : Concepts Related to Financial Markets and Institutions
- Concept of Risk
  - Concept and types of return and yield
  - Asset Pricing Models
  - Valuation of Assets
- Week 3** : Theories of Level and Structure of Interest Rates
- Week 4** : Financial Regulations and Regulatory Institutions in India  
(RBI,SEBI,IRDA,PFRDA)  
Operating Procedures of Monetary Policy  
Corporate Governance and SEBI
- Week 5** : Commercial Banking
- Role of Banks
  - Banks' Financial Statement
  - Banks' Computation
  - International Banking
  - NPA
  - Risk Management in Banking
- Week 6** : Other Important Financial Institutions – I  
(Provident Fund, Pension Fund, Insurance Companies)
- Week 7** : Other Important Financial Institutions – II  
(Mutual Fund, Credit Rating Agencies, Merchant Bank, Venture Capital Funds)
- Week 8** : Money Markets in India  
(Call Money Market, Treasury Bill, Commercial Paper, Certificate of Deposit)
- Week 9** : Bond Market
- Bond Features
  - Bond Price Volatility
  - Government Security Market
  - Corporate Bond Market
  - Public Sector Undertaking Bonds
- Week 10** : Classification of Stock Market and Securities
- IPO
  - Stock Exchanges
  - Stock Market Indices
  - Market Micro-Structure in Stock Market
- Week 11** : Derivatives Market
- Types of Derivatives
  - Important Concepts used in Derivatives Market
  - Pricing of Futures, Options and Swaps
- Week 12** : Foreign Exchange Market

- Foreign Exchange Market Structure
- Risk Management in Foreign Exchange Market
- Exchange Rate Determination
- Foreign Capital – FDI & FII
- Central Bank Intervention in Foreign Exchange Market

#### Books and references

- (1) Financial Institutions and Markets: Structure, Growth and Innovations by L.M. Bhole and J. Mahakud, 6th Edition, McGraw Hill Education, Chennai, India
- (2) Financial Markets and Institutions by Frederic Mishkin and Stanley Eakins, 8th Edition, Pearson Education
- (3) Financial Institutions & Markets by Jeff Madura, 10 edition Cengage
- (4) Bond Evaluation, Selection and Management by R. Stafford Johnson, 2nd Edition, John Wiley & Sons, Inc. Hoboken, New Jersey
- (5) Analysis of Investments and Management of Portfolios by Frank Reilly and Keith Brown, 10th Edition, Cengage Publication.

# Graph Theory

By Prof. Soumen Maity | IISER Pune

[Join](#)

## Learners enrolled: 1749

Graph theory began in 1736 when the Swiss mathematician Euler solved Konigsberg seven-bridge problem. It has been two hundred and eighty years till now. Graph theory is the core content of Discrete Mathematics, and Discrete Mathematics is the theoretical basis of computer science and network information science. This course introduces in an elementary way some basic knowledge and the primary methods in Graph Theory.

**INTENDED AUDIENCE :** B.Sc, M.Sc, B.Tech, M.Tech

**PREREQUISITES :** NIL

**INDUSTRY SUPPORT :** It will be recognized by several industries & academic institutes

### Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	8 weeks
Start Date :	24 Jan 2022
End Date :	18 Mar 2022
Exam Date :	27 Mar 2022 IST
Enrollment Ends :	31 Jan 2022
Category :	<ul style="list-style-type: none"><li>○ Mathematics</li><li>○ Foundations of Computing</li></ul>
Credit Points :	2
Level :	Undergraduate/Postgraduate

This is an AICTE approved FDP course

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## Course layout

- Week 1:** Paths, Cycles, Trails, Eulerian Graphs, Hamiltonian Graphs
- Week 2:** Bipartite graphs, Trees, Minimum Spanning Tree Algorithms
- Week 3:** Matching and covers
- Week 4:** Maximum matching in Bipartite Graphs
- Week 5:** Cuts and Connectivity
- Week 6:** 2-connected graphs
- Week 7:** Network flow problems, Ford-Fulkerson algorithm
- Week 8:** Planar graphs; Coloring of graphs

## Books and references

1. Introduction to Graph Theory: D.B. West (2001) Prentice Hall.
2. Graph Theory: F.Harary (1969) Addison-Wesley.
3. Graph Theory: R. Diestel (2006) Springer .and network information science. This course introduces in an elementary way some basic knowledge and the primary methods in Graph Theory

# Enhancing Soft Skills and Personality

By Prof. T. Ravichandran | IIT Kanpur

[Join](#)

## Learners enrolled: 8743

The course aims to cause an enhanced awareness about the significance of soft skills in professional and inter-personal communications and facilitate an all-round development of personality. Hard or technical skills help securing a basic position in one's life and career. But only soft skills can ensure a person retain it, climb further, reach a pinnacle, achieve excellence, and derive fulfilment and supreme joy. Soft skills comprise pleasant and appealing personality traits as self-confidence, positive attitude, emotional intelligence, social grace, flexibility, friendliness and effective communication skills. The focus of this course is on interpersonal and management skills. It has been approved for "[Faculty Development Programme](#)" by AICTE.

**INTENDED AUDIENCE** : Students, Teachers, Professionals, Trainers, Leaders, Employers

**PREREQUISITES** : No prerequisite is required. Background knowledge of MOOC Course on "Developing Soft Skills and Personality" is preferred. "Developing Soft Skills and Personality" course was also recognized as FDP during Aug-Oct'18 Period.

**INDUSTRY SUPPORT** : All industry/companies/organisations will recognize and value this course and recommend this for their employees and trainee programs

### Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	8 weeks
Start Date :	21 Feb 2022
End Date :	15 Apr 2022
Exam Date :	24 Apr 2022 IST
Enrollment Ends :	21 Feb 2022
Category :	o Humanities and Social Sciences
Credit Points :	2
Level :	Undergraduate/Postgraduate

This is an AICTE approved FDP course



## Course layout

### **Week 1 :**

- Highlights of Developing Soft Skills and Personality Course-1-24
- Highlights of Developing Soft Skills and Personality Course-25-48
- Definitions and Types of Mindset
- Learning Mindsets
- Secrets of Developing Growth Mindsets

### **Week 2 :**

- Importance of Time and Understanding Perceptions of Time
- Using Time Efficiently
- Understanding Procrastination
- Overcoming Procrastination
- Don't Say "Yes" to Make Others Happy!

### **Week 3 :**

- Types of People
- How to Say "No"
- Controlling Anger
- Gaining Power from Positive Thinking-1
- Gaining Power from Positive Thinking-2

### **Week 4 :**

- What Makes Others Dislike You?
- What Makes Others Like You?-1
- What Makes Others Like You?-2
- Being Attractive-1
- Being Attractive-2

### **Week 5 :**

- Common Errors-1
- Common Errors-2
- Common Errors-3
- Common Errors-4
- Common Errors-5

### **Week 6 :**

- Humour in Communication
- Humour in the Workplace
- Function of Humour in the Workplace
- Money and Personality
- Managing Money

### **Week 7 :**

- Health and Personality
- Managing Health-1: Importance of Exercise
- Managing Health-2: Diet and Sleep
- Love and Personality
- Managing Love

### **Week 8 :**

- Ethics and Etiquette
- Business Etiquette
- Managing Mind and Memory
- Improving Memory
- Care for Environment
- Highlights of the Course

### **Books and references**

- Dorch, Patricia. What Are Soft Skills? New York:Execu Dress Publisher, 2013.
- Kamin, Maxine. Soft Skills Revolution: A Guide for Connecting with Compassion for Trainers,Teams, and Leaders. Washington, DC: Pfeiffer &Company, 2013.
- Klaus, Peggy, Jane Rohman & Molly Hamaker.The Hard Truth about Soft Skills. London:HarperCollins E-books, 2007.
- Petes S. J., Francis. Soft Skills and ProfessionalCommunication. New Delhi: Tata McGraw-HillEducation, 2011.
- Stein, Steven J. & Howard E. Book. The EQ Edge: Emotional Intelligence and Your Success.Canada: Wiley & Sons, 2006.

# Introduction to Laser

By Prof. M. R. Shenoy | IIT Delhi

[Join](#)

## Learners enrolled: 449

This course introduces LASER to senior undergraduate students, as well as first year postgraduate students. The objective is to provide a detailed account of the basic physics, including resonator physics, and the principle of operation of Lasers. Issues relevant to the design and output characteristics of the Lasers, and some specific laser systems would also be discussed. The course is 'applied' in nature, and could be taken by B.E/B.Tech IIIrd/ IVth Year, M.Sc IInd/ M.Tech. I Year. Working engineers/scientists/teachers, who did not have exposure to the subject earlier, would also find it very useful, if interested. The course would require a regular and serious study schedule on the part of the students (to understand the subject and do well).

**INTENDED AUDIENCE :** IIIrd, IVth year B.Tech / M.Sc (Physics/ Electronics/ Electronic Sciences) students, and also M.Tech Ist Sem students, who had no previous exposure to Lasers in any course. PLUS Engineers working/ dealing with Lasers

**PREREQUISITES :** Basic undergraduate-level knowledge of Electromagnetics, Optics, and Atomic Physics/Modern Physics would be required.

**INDUSTRIES SUPPORT :** Companies and R&D Laboratories working on Laser Applications, Optoelectronic and Optical Communication are expected to value this course.

## Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	12 weeks
Start Date :	24 Jan 2022
End Date :	15 Apr 2022
Exam Date :	23 Apr 2022 IST
Enrollment Ends :	31 Jan 2022
Category :	o Physics
Credit Points :	3

Level :

Undergraduate/Postgraduate

This is an AICTE approved FDP course

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Course layout

**Week 1:**PART – I: Interaction of Radiation with Matter

General Introduction, Spontaneous and stimulated emissions, the Einstein coefficients

**Week 2:**Line shape function, Line-broadening mechanisms: Homogeneous and inhomogeneous broadening, natural-, Doppler- and collision broadening.

**Week 3:** PART – II: Scheme of Light Amplification

Rates of stimulated emission and absorption, condition for amplification by stimulated emission, the meta-stable state and laser action.

**Week 4:**3-level and 4-level pumping schemes. Laser Rate Equations: Two-, three- and four-level laser systems, condition for population inversion, gain saturation;

**Week 5:**Laser amplifiers, gain and bandwidth; Rare earth doped fiber amplifiers.

**Week 6:**PART – III:

Optical Resonators Plane mirror resonator: resonance frequencies, cavity loss, cavity lifetime and Q-factor;

**Week 7:** Spherical mirror resonators: Ray paths in the resonator, stable and unstable resonators, resonator stability condition

**Week 8:**Transverse modes of laser resonators. Hermite-Gauss modes of a spherical mirror resonator. Gaussian beams in laser resonators.

**Week 9:**PART – IV:

The Laser Laser Oscillations, Optical feedback, threshold condition, variation of laser power near threshold, optimum output coupling,

**Week 10:**Characteristics of the laser output, oscillation frequency, Mode selection, single-frequency lasers; Methods of pulsing lasers, Q-switching and mode-locking.

**Week 11:** PART – V: Some Laser Systems: Ruby, He-Ne, Nd:YAG, Fiber lasers

**Week 12:**Tunable lasers: The Ti Sapphire laser, Semiconductor lasers; Laser safety.

Books and references

1. B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., 2nd Ed. (2007), Ch.10, 13-15.
2. K. Thyagarajan and Ajoy Ghatak, Lasers: Fundamentals and Applications, Macmillan Publishers India Ltd., 2nd Ed. (2011), Ch.4, 5, 7, 10-13.
3. W. Koechner, Solid-State Laser Engineering, Springer, 6th Ed. (2006).
4. W. T. Silfvast, Laser Fundamentals, Cambridge Univ. Press, Cambridge, (1996).

# Research Methodology

By Prof. Soumitro Banerjee | IISER Kolkata

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**Learners enrolled: 1771**

## About the Course :

The course covers all the conceptual and methodological issues that go into successful conduction of research. That includes philosophy of science, the methodological issues in measurement, proposing and testing hypotheses, scientific communication and the ethical issues in the practice of science.

**INTENDED AUDIENCE :** This is a compulsory course for all PhD students as mandated by UGC. Bachelor's and Master's students interested in pursuing a research career may also take it.

**PREREQUISITES :** Nil

**INDUSTRY SUPPORT :** Nil

## Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	12 weeks
Start Date :	24 Jan 2022
End Date :	15 Apr 2022
Exam Date :	23 Apr 2022 IST
Enrollment Ends :	31 Jan 2022
Category :	<ul style="list-style-type: none"><li>○ Faculty Domain - Fundamental</li><li>○ Multidisciplinary</li></ul>
Credit Points :	3
Level :	Postgraduate

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## Course layout

**Week 1:** Philosophy of Science (subjective versus objective, materialism versus idealism, causality, etc.)

**Week 2:** Logical Reasoning (inductive logic, deductive logic, syllogistic logic)

**Week 3:** History of development of science and the influence of philosophy

**Week 4:** What Scientists Actually Do

**Week 5:** Forming a Hypothesis

**Week 6:** Techniques of Scientific Measurement

**Week 7:** Testing of hypothesis

**Week 8:** Methods of Theoretical Research

**Week 9:** The Art of Scientific Communication

**Week 10:** Presentation in Seminars and Conferences

**Week 11:** Sponsored Research

**Week 12:** Ethical Conduct in Science

## Books and references

I have written a book titled “Research Methodology for Natural Sciences” which is in the process of being published by IISc Press.

# Psychology of Stress, Health and Well-being

By Prof. Dilwar Hussain | IIT Guwahati

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## Learners enrolled: 1344

In today's world, mental distress and disorders are common and accounting for a significant burden of disability within nations. However, at the same time, there has been a growing interest in understanding and enhancing positive mental health and wellbeing particularly in the field of psychology. Overall, this course systematically addresses the issues of health, adjustment and well-being. It reviews the topics of stress and health while adding happiness and well-being theory and research to enrich our understanding of both negative and positive side of human behavior. Overall, this course will attempt to provide insights from the field of psychology to make your life more satisfying and meaningful.

**INTENDED AUDIENCE** : UG and PG students of Humanities and Social Sciences, Sciences and Engineering

**PREREQUISITES** : None

**INDUSTRIES SUPPORT** : None

## Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	12 weeks
Start Date :	24 Jan 2022
End Date :	15 Apr 2022
Exam Date :	24 Apr 2022 IST
Enrollment Ends :	31 Jan 2022
Category :	o Humanities and Social Sciences
Credit Points :	3
Level :	Undergraduate/Postgraduate

This is an AICTE approved FDP course

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## Course layout

**Week 1: Stress, health and well-being:** Overview; Nature and physiology of stress

**Week 2: Stress, trauma and health:** Mind-body connections; Stress and non-infectious diseases; Stress and infectious diseases; Stress and psychological disorder

**Week 3: Positive aspects of stress and trauma:** Stress, trauma and posttraumatic growth; Factors influencing stress tolerance

**Week 4: Coping processes and strategies 1 :** Types of coping strategies; Coping strategies of limited value; Unconscious mind and defensive coping; Characteristics of constructive coping; physical ways of coping

**Week 5: Coping processes and strategies 2:** Mind-body strategies; Mental ways of coping; Coping with social support and meaning in life; Mindfulness and acceptance

**Week 6: Beyond stress and recovery:** Positive mental health and well-being

**Week 7: Psychology of happiness:** What is happiness? What makes us happy? Socio-economic factors and happiness; Positive emotions

**Week 8: Can we become happier?** Genetic set-point and hedonic adaptation; Sustainable happiness model and intentional activities

**Week 9: Happiness Activities 1:** Expressing gratitude and positive thinking; Love and kindness; Avoiding overthinking and social comparison

**Week 10: Happiness Activities 2:** Identifying signature strengths; Achieving happiness with “Flow”.

**Week 11: Is happiness sufficient?** The concept of eudaimonic well-being; Self-determination and motivation

**Week 12: Meaning and purpose in life:** The concept of meaning in life and logo-therapy; Life goals

## Books and references

1. W. Weiten, and M. A. Lloyd, Psychology Applied to Modern Life: Adjustment in the 21st Century, Wadsworth Publishing, 2007
2. R. Harington, Stress, Health and well-being: Thriving in the 21st century, Wadsworth Publishing, 2013.
3. I. Boniwell, Positive psychology in a nutshell, McGraw-Hill Education, 2012.
4. S. Lyubomirsky, The how of happiness, Penguin Press, 2008.



# Waste to Energy Conversion

By Prof. P. Mondal | IIT Roorkee

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## Learners enrolled: 878

The course deals with the production of energy from different types of wastes through thermal, biological and chemical routes. It is intended to help the young scientific professionals to keep their knowledge upgraded with the current thoughts and newer technology options along with their advances in the field of the utilization of different types of wastes for energy production.

**INTENDED AUDIENCE** : It is a Elective Course for PG and UG with Hon.

**PREREQUISITES** : BE in Chemical, Mechanical, Environmental Eng., Biotech.

**INDUSTRY SUPPORT** : NIL

### Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	8 weeks
Start Date :	24 Jan 2022
End Date :	18 Mar 2022
Exam Date :	27 Mar 2022 IST
Enrollment Ends :	31 Jan 2022
Category :	<ul style="list-style-type: none"><li>○ Chemical Engineering</li><li>○ Energy and Environment</li><li>○ Energy Systems</li></ul>
Credit Points :	2
Level :	Undergraduate

This is an AICTE approved FDP course

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## Course layout

- Week 1** - Introduction, characterization of wastes.
- Week 2** - Energy production from wastes through incineration, energy production through gasification of wastes.
- Week 3** - Energy production through pyrolysis and gasification of wastes, syngas utilization.
- Week 4** - Densification of solids, efficiency improvement of power plant and energy production from waste plastics.
- Week 5** - Energy production from waste plastics, gas cleanup.
- Week 6** - Energy production from organic wastes through anaerobic digestion and fermentation, introduction to microbial fuel cells.
- Week 7** - Energy production from wastes through fermentation and transesterification.
- Week 8** - Cultivation of algal biomass from wastewater and energy production from algae.

## Books and references

- Rogoff, M.J. and Screve, F., "Waste-to-Energy: Technologies and Project Implementation", Elsevier Store.
- Young G.C., "Municipal Solid Waste to Energy Conversion processes", John Wiley and Sons.
- Harker, J.H. and Backhurst, J.R., "Fuel and Energy", Academic Press Inc.
- EL-Halwagi, M.M., "Biogas Technology- Transfer and Diffusion", Elsevier Applied Science.
- Hall, D.O. and Overeed, R.P., "Biomass - Renewable Energy", John Wiley and Sons.
- Mondal, P. and Dalai, A.K. eds., 2017. *Sustainable Utilization of Natural Resources*. CRC Press.

# Soil Science and Technology

By Prof. Somsubhra Chakraborty | IIT Kharagpur

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**Learners enrolled: 537**

## ABOUT THE COURSE:

This core course is aimed to provide a basic understanding of various aspects of soil science along with some state-of-the-art technologies. The objective is to provide knowledge of different physical and chemical properties of soil. Most importantly this course will impart different preparatory and exploratory data analysis approaches for unconventional digital soil mapping, modeling and mapping of continuous and categorical soil attributes, hyperspectral and proximal soil sensors and their applications for modeling of soil properties, soil pollution and remediation which are not covered in the traditional courses of soil science.

**INTENDED AUDIENCE:** Agriculture, Environmental science, Agricultural engineering

**PREREQUISITES:** NIL

**INDUSTRY SUPPORT:** Fertilizer companies; Soil testing services; Soil and environmental pollution consulting companies; Soil remote sensing solution services

## Summary

Course Status :	Upcoming
Course Type :	Core
Duration :	12 weeks
Start Date :	24 Jan 2022
End Date :	15 Apr 2022
Exam Date :	23 Apr 2022 IST
Enrollment Ends :	31 Jan 2022
Category :	○ Agricultural and Food Engineering
Credit Points :	3
Level :	Undergraduate

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#### Course layout

**Week 1:** Basic Overview Of Soil; Ecosystem Services Of Soils; Weathering; Soil Formation; Soil Profile

**Week 2:** Soil Taxonomy; Soil Orders-1; Soil Orders-2; Soil Colour And Soil Texture; Soil Structure

**Week 3:** Soil Tillage And Soil Density; Soil Porosity And Consistency; Soil Water Energy Concepts; Measurement Of Soil Water; Tutorial

**Week 4:** The Flow Of Liquid Water Into Soil; Qualitative Description Of Soil Wetness; Soil Air; Soil Temperature; Tutorial

**Week 5:** Silicate Clays-1; Silicate Clays -2; Sources Of Charges On Soil Colloids; Cation Exchange Capacity; Sorption Of Pesticides In Soil

**Week 6:** Diffuse Double Layer Theories; Adsorption Isotherms; Soil Acidity; Soil Alkalinity And Salinity; Submerged Soils

**Week 7:** Essential Plant Nutrients; Soil Nitrogen; Biological Nitrogen Fixation; Soil Phosphorus And Potassium; Fertilizers

**Week 8:** Soil Testing-1; Soil Testing-2; Soil Organic Matter And Climate Change; Soil Organisms; Compost

**Week 9:** Soil Erosion And Land Degradation; The Universal Soil-loss Equation; Conservation Tillage; Wind And Tillage Erosion; Toxic Organic Chemicals In Soils

**Week 10:** Remediation Of Soil Organic Pollution; Soil Contamination With Toxic Inorganic Substances; Remediation Of Soil Inorganic Pollution; Soil Survey; Remote Sensing In Soil Survey

**Week 11:** Gis And Gps; Geostatistics; Basics Of Diffuse Reflectance Spectroscopy; Diffuse Reflectance Spectroscopy For Soils; PxrF Soil Applications

Overview Of Digital Soil Mapping; Modeling And Mapping Of Continuous Variables; Modeling And Mapping Of Categorical

**Week 12:** Variables; Pedotransfer Functions; Accuracy And Uncertainty Of Dsm

#### Books and references

1. The Nature and Properties of Soils by Nyle C. Brady and Ray R. Weil
2. Fundamentals of soil physics by Daniel Hillel
3. Soil Fertility And Fertilizers by Havlin, Tisdale, Nelson and Beaton
4. Digital Soil Mapping: An Introductory Perspective by Lagacherie, McBratney and Voltz

# Nanotechnology In Agriculture

By Prof. Mainak Das | IIT Kanpur

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## Learners enrolled: 834

Modern agriculture is a chemical intensive process starting from fertilizer, pesticide to food preservation. Modern nanotechnology tools if used judiciously in future, have the ability to offer sustainable development along with the optimal, precision and more effective use of chemicals. In this course, I will be sharing my journey from basic agriculture to modern day nano particle based agriculture practices.

**INTENDED AUDIENCE** : Students of Agriculture Engineering, Biotechnology, Botany, Biochemistry and Design  
**PREREQUISITES** : 10+2 in science  
**INDUSTRY SUPPORT** : Agriculture industry, Seed industry, Fertilizer industry, Food technology industry

### Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	8 weeks
Start Date :	21 Feb 2022
End Date :	15 Apr 2022
Exam Date :	24 Apr 2022 IST
Enrollment Ends :	21 Feb 2022
Category :	○ Biological Sciences & Bioengineering
Credit Points :	2
Level :	Undergraduate/Postgraduate

This is an AICTE approved FDP course

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#### Course layout

**Week 1:** History of agriculture and the role of chemicals in modern agriculture

**Week 2:** Overview of nanotechnology

**Week 3:** Application of nanotechnology in modern day agriculture practices I

**Week 4:** Application of nanotechnology in modern day agriculture practices II

**Week 5:** Application of nanotechnologies in animal production

**Week 6:** Nanotechnology and shelf life of agricultural and food products

**Week 7:** Nanotechnologies for water quality and availability

**Week 8:** Green nanotechnology and the role of good governance and policies for effective nanotechnology development

#### Books and references

- E-Reference materials will be provided during the course

# Business Statistics

By Prof. Mukesh Kumar Barua | IIT Roorkee

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## Learners enrolled: 1449

This course will introduce you to business statistics, or the application of statistics in the workplace. Statistics is a course in the methods for gathering, analyzing, and interpreting data. You'll also explore basic probability concepts, including measuring and modeling uncertainty, and you'll use various data distributions, along with the Linear Regression Model, to analyze and inform business decisions.

**INTENDED AUDIENCE** : Students of B.Tech. M.Tech, PhD and working professionals

**PREREQUISITES** : None

**INDUSTRY SUPPORT** : None

### Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	12 weeks
Start Date :	24 Jan 2022
End Date :	15 Apr 2022
Exam Date :	23 Apr 2022 IST
Enrollment Ends :	31 Jan 2022
Category :	<ul style="list-style-type: none"><li>○ Management Studies</li><li>○ Operations</li></ul>
Credit Points :	3
Level :	Undergraduate/Postgraduate

This is an AICTE approved FDP course

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## Course layout

**Week 1** : Introduction, data collection and presenting data in tables

**Week 2** : Numerical descriptive measures and basic probability

**Week 3** : Discrete and continuous probability distributions

**Week 4** : Sampling and sampling distributions

**Week 5** : Confidence interval estimation

**Week 6** : One sample tests and hypothesis testing

**Week 7** : Two sample tests means

**Week 8** : Two sample tests proportions and variance

**Week 9** : ANOVA

**Week 10** : Chi-Square tests

**Week 11** : Simple linear regression

**Week 12** : Multiple regression basics

## Books and references

Nil



# Human Behaviour

By Prof. Naveen Kashyap | IIT Guwahati

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**Learners enrolled: 1627**

We as intelligent beings have always wondered why we do what we do. The most interesting knowledge that humans beings would kill to possess would be the knowledge to control other people. The basic premise of being human is individual difference (we are all different). One science that helps people in understanding other people and scientifically predicting their actions is the science of psychology. In the present course, I will make an attempt to simplify the science of human behavior.

**INTENDED AUDIENCE :** UG/PG/PhD

**PREREQUISITES :** NIL

**INDUSTRY SUPPORT :** NIL

## Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	8 weeks
Start Date :	21 Feb 2022
End Date :	15 Apr 2022
Exam Date :	23 Apr 2022 IST
Enrollment Ends :	21 Feb 2022
Category :	o Humanities and Social Sciences
Credit Points :	2
Level :	Postgraduate

This is an AICTE approved FDP course

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## Course layout

**Week 1** : Introduction to the science of human behavior

**Week 2** : Sensation & Perception-I

**Week 3** : Perception-II, Learning

**Week 4** : Memory and Language-I

**Week 5** : Language-II and Emotion

**Week 6** : Intelligence

**Week 7** : Personality

**Week 8** : Social influence and cognition

## Books and references

1. Atkinson and Hillgard, Psychology: An introduction, Cengage Press
2. Cacioppo, J, Discovering Psychology, Cengage Learning
3. Baron, R, Psychology, Pearson Press.

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