# ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

**Guwahati**

**Course Structure and Syllabus**
**(From Academic Session 2020-21 onwards)**

**M.Tech**
**CIVIL ENGINEERING**

**SPECIALIZATION: DESIGN OF CIVIL ENGINEERING STRUCTURES**

## 1st Semester

1.

# ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

## Guwahati

## Course Structure
**(From Academic Session 2020-21 onwards)**

**M.Tech: Civil Engineering**
**Specialization: Design of Civil Engineering Structures**
**1st Semester**

| Theory/ Practical | Sl. No. | Sub Code | Subject | Hours Per week | | | Credit | Marks | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CE | ESE |
| **Core** | | | | | | | | | |
| Theory | 1 | CED202101 | Structural Dynamics | 3 | 0 | 0 | 3 | 30 | 70 |
| | 2 | CED202102 | Design of Substructure | 3 | 0 | 0 | 3 | 30 | 70 |
| | 3 | CED202103 | Earthquake Engineering | 3 | 0 | 0 | 3 | 30 | 70 |
| Practical | 1 | CED202114 | Experimental Methods in Civil Engineering Lab | 0 | 0 | 4 | 2 | 30 | 70 |
| **Program Elective-1** | | | | | | | | | |
| Theory | 1 | CED202PE1* | Program Elective-1 | 3 | 0 | 0 | 3 | 30 | 70 |
| **Open Elective-1** | | | | | | | | | |
| Theory | 1 | CED202OE1* | Open Elective-1 | 3 | 0 | 0 | 3 | 30 | 70 |
| **Mandatory Learning Course** | | | | | | | | | |
| Theory | 1 | MLC202106 | Research Methodology and IPR | 2 | 0 | 0 | 2 | 30 | 70 |
| **Audit Course-1** | | | | | | | | | |
| Theory | 1 | MAC20211* | Audit Course-1 | 2 | 0 | 0 | 0 | - | 100 |
| Total | | | | **19** | **0** | **4** | **19** | **210** | **590** |
| **Total contact hours per week: 23**<br>**Total Credit**: **19** | | | | | | | | | |

## Program Elective-1

| Sl No | Code | Subject |
|---|---|---|
| 1 | CED202PE11 | Reinforced Soil Structure |
| 2 | CED202PE12 | Continuum Mechanics |
| 3 | CED202PE13 | Geological Investigations for Civil Engineering Structures |
| 4 | CED202PE1* | Any other subject offered from time to time with the approval of the University |

## Open Elective-1

| Sl No | Code | Subject |
|---|---|---|
| 1 | CED202OE11 | Numerical Methods |
| 2 | CED202OE12 | Operation Research Technique |
| 3 | CED202OE1* | Any other subject offered from time to time with the approval of the University |

## Audit Course-1

| Sl No | Code | Subject |
|---|---|---|
| 1 | MAC202111 | English for Research Paper Writing |
| 2 | MAC202112 | Disaster Management |
| 3 | MAC202113 | Sanskrit for Technical Knowledge |
| 4 | MAC202114 | Value Education |
| 5 | MAC20211* | Any other subject offered from time to time with the approval of the University |

**Detailed Syllabus:**

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **CED202101** | **Structural Dynamics** | **3-0-0** | **3** |

SDOF systems: Equations of Motion, Free vibration, damping, Forced vibrations under harmonic, impulse and general loadings, Response spectrum Generalized SDOF systems: Rigid body distributed mass and stiffness systems; MDOF Systems: Dynamic properties, modal damping, classical damping, modal superposition methods; Numerical methods in dynamics: Eigen value analysis, direct integration scheme: Continuous systems: Equations of motion, Hamilton's principle, Lagrangian formulation, Free and force vibration scheme, Wave propagation; Introduction to Random vibration: Random variables, Random process, moment and characteristic function, spectral analysis, response to random excitation; Application of structural dynamics in the design of block and frame foundation.

**Textbooks/ Reference Books:**


1. R.W. Clough and J. Penzien, Dynamics of Structures, Second edition, McGraw Hill international edition, 1993.
2. Mario Paz, Structural dynamics, CBS Publishers 1987.
3. Anil K. Chopra, Dynamics of structures: Theory and applications to earthquake engineering, PHI Ltd., 1997.
4. K. Rao, Vibration analysis and foundation dynamics, Wheeler, 1998.
5. E. Siniu and R. H. Scanlan, Wind effects on structures: fundamentals and applications to design, John Wiley and Sons, 1997.

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| CED202102 | Design of Substructure | 3-0-0 | 3 |

**MODULE 1: Shallow Foundations**

Introduction, Field plate load test, Effect of size of footing on settlement, Design charts from SPT values for footing on sand, Safe bearing pressure from empirical equations, foundation settlement, Foundation settlement, Methods of computing settlements, computation of elastic and consolidation settlement.

**MODULE 2: Combined and Mat Foundation**

Safe bearing pressure for mat foundations, design of mat foundation by rigid method and elastic plate method, design of combined footing by rigid method and elastic line method.

**MODULE 3: Pile Foundation**

General theory for ultimate bearing capacity of piles, Pile load capacity by different methods, Bearing capacity from static cone penetration method, uplift resistance of pile, progressive and cyclic pile load test, Non-dimensional method of analysis of vertical piles subjected to lateral loads, pile load capacity of driven pile using dynamic formula, pile load capacity of under-reamed piles.

**MODULE 4: Caisson Foundation**

Stability analysis of well foundations, grip length of well, scour depth in cohesionless soil.

**Textbooks/ Reference Books:**


1. Swami Saran, Design of substructures, Oxford and IBH publishing Co. Ltd.
2. Narayan V. Nayak, Foundation Design Manual, Dhanpat Rai Publications

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **CED202103** | **Earthquake Engineering** | **3-0-0** | **3** |

Earthquakes: Causes, Magnitude and Intensity, Ground Motions, Site effects, Sensors; Response spectrum: Construction, Characteristics, Design Response spectrum; Linear Earthquake analysis: Idealization of structures, Response spectrum analysis, Torsionally coupled systems, Frequency domain analysis, Time domain analysis; Nonlinear Earthquake analysis : Force-deformation relationships, Equation of motion, Controlling parameters, Ductility demand, Allowable ductility; Earthquake resistance design: philosophy ductility based design, Detailing provisions, Codal Provisions, Concepts of passive controls; Soil structure interaction

**Textbooks/ Reference Books:**


1. R.W. Clough and J. Penzien, Dynamics of Structures, McGraw Hill, 2nd Ed., 1993.
2. M. Paz, Dynamics of Structures, CBS Pub., 1987.
3. A. K. Chopra, Dynamics of Structures - Theory and application to earthquake engineering, Pearson Education, 3rd edition, 2007.
4. T. Paulay and M.S.N. Priestley, Seismic Design of Reinforced Concrete and Masonry Buildings, John Wiley and Sons, 1992.
5. M. N. S. Priestley, F. Seible and G.M. Calvi, Seismic Design and Retrofit of Bridges, John Wiley and Sons, 1996
6. D. J. Dowrick, Earthquake Resistant Design for Engineers and Architects, John Wiley and Sons, 1987.
7. S.L. Kramer, Geotechnical and earthquake engineering, Pearson Education

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **CED202114** | **Experimental Methods in Civil Engineering Lab** | **0-0-4** | **2** |

Mix design for high strength concrete, use of admixture/plasticizer; Non destructive evaluation of strength of concrete/steel specimens; Study of field tests for determination of bearing capacity, pile load capacity, plate load test, pile load test, Testing of beams subjected to transverse (static/dynamic) loading; Testing of prestressed concrete beams; Testing of slab – study of flexural and punching failure.

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **CED202PE11** | **Reinforced Soil Structure** | **3-0-0** | **3** |

Historical background; Principles, concepts and mechanism of reinforced earth; Design consideration for reinforced earth and reinforced soil structures; geosynthetics-their composition, manufacture, properties, functions, testing and applications in reinforced earth structures; Design of reinforced soil structures like retaining walls, embankments, foundation beds etc.; Designing for Separation, Filtration, Drainage and Roadway Applications; Designing for Landfill Liners and Barrier Applications; Case histories of applications.

**Textbooks/ Reference Books:**


1. Clayton, C.R.I., Milititsky, J. and Woods, R.I., Earth Pressure and Earth Retaining Structures, Blackie Academic & Professional, 1993.
2. Ingold, T, Reinforced Earth, Thomas Telford Ltd., 1982.
3. Jones, C.J.F.P, Earth Reinforcement and Soil Structures, Butterworth, 1985.
4. Koerner, R.M, Designing with Geosynthetics, Prentice Hall, 1993.

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **CED202PE12** | **Continuum Mechanics** | **3-0-0** | **3** |

Basic concepts of the theory of continuous media; introduction to tensor algebra; theory of stresses; infinitesimal and finite strains; strain-displacement relationships; compatibility; stress-strain relationships; boundary value problem in elasticity; plane stress and plane strain case; stress function approaches; plane problems in Cartesian and polar coordinates; elements of plasticity; yield criteria; flow rule and hardening. Plastic stress-strain relationships; variational methods; Introduction to Hamilton's principles; Rayleigh-Ritz and Weighted residual methods; Introduction to thin plates; stability theory; torsion of noncircular sections.

**Textbooks/ Reference Books:**


1. D.S. Chandrasekharaiah and L. Debnath, Continuum Mechanics, Prism Books Pvt. Ltd.Bangalore, 1994.
2. S. Timoshenko and J.N. Goodier, Theory of Elasticity, McGraw Hill Book Company,International Ed, 1970.
3. I. H. Shames and F. A. Cozzarellie, Elastic and Inelastic Stress Analysis, Prentice Hall New Jersey 1992.
4. S.P. Timoshenko and S.W. Krieger, Theory of Plates and Shells, McGraw Hill International Ed, 1959.

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| CED202PE13 | Geological Investigations for Civil Engineering Structures | 3-0-0 | 3 |

Concepts of stress, strain, Mohr circle and failure theories. Engineering properties of rocks, and soils and their classifications. Weathering. Discontinuities in rock masses. Geology applied to engineering problems such as dam sites and reservoir foundations, highway and building structures, tunnels, geology of construction materials, landslides, case histories, engineering properties of rocks and soils, engineering classification of rocks and soils. Rock slope stability, landslides and stability of structures, construction materials, dams and reservoirs, tunnels and excavations, foundations and structures in earthquake prone regions. Earthquakes and seismic design of structures. Engineering geological aspects of weaker materials. Reinforcements of rock masses. Site investigations and important case studies. Engineering geological and hydrogeological explorations. Geophysical Surveys- Seismic, resistivity, gravity and magnetic methods.

**Textbooks/ Reference Books:**


1. M.B.Dobrin, and C.H. Savit, Introduction to geophysical prospecting, McGraw Hill, 1988.
2. VF.G. Bell, Fundamentals of Engineering Geology, Butterworths, 1983.
3. D.P. Krynine and W.P. Judd, Principles of Engineering Geology. McGraw Hill, 1957.
4. I.W. Farmer, Principles of Engg. Geology 1976.
5. K V G K Gokhale, Principles of Engineering Geology. B S Publications, Hyderabad, First Edition, 2005.
6. A. C Waltham, Foundations of Engineering Geology, Blackie Academic & Professional, Chapman & Hall , First Edition, 1997.
7. K. Allan, General Geology for Engineers, Second Edition, Prentice & Hall, 1995.
8. P. Kesavulu, Engineering Geology, Oxford University Press, Second Edition, 1999.

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **CED202OE11** | **Numerical Methods** | **3-0-0** | **3** |

Linear equations and eigen value problems, Accuracy of approximate calculations, Nonlinear equations, interpolation, differentiation and evaluation of single and multiple integrals, initial and boundary value problems by finite difference method, Newton's method, variation and weighted residual methods, introduction to finite element methods, fundamental of statistical distribution.

**Textbooks/ Reference Books:**

1. J. B. Scarborough, Numerical Mathematical Analysis, Oxford & IBH Publishing Co. Pvt. Ltd., 2000.

2. K. K. Jain, S. R. K Iyengar and R. K. Jain, Numerical Methods - Problem and Solutions, Wiley India Pvt. Ltd, 2001.

3. R.W. Hamming, Numerical Methods for Scientist and Engineers, McGraw Hill, 1998.

4. J. H. Mathews and K.D. Fink, Numerical Methods using MATLAB, Pearson Education, 2004.

5. A. J. Hayter, Probability and Statistics, Duxbury, 2002.

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **CED202OE12** | **Operation Research Technique** | **3-0-0** | **3** |

Introduction to Operation Research, Foundation Mathematics & Statistics, Modelling Approach, Various Real Life Situations; Linear programming problem - Definitions & its application, Various Components of LP Problem formulation, Linearity Requirements, Maximization & Minimization Problem; Solution Solution of LPP using---Simultaneous Equation & Graphical Method, Simplex Method, Sensitivity Analysis Duality Theory, Revised Simplex Method, Artificial Variable Technique, Big-M Method; Transportation problem -- Optimal Solution by North West Corner Method, Least Cost Method, Vogel's Approximation Method. Optimality Test—MOBI Method; Assignment problem -- formulation, Hungarian method, unbalanced assignment problem; Network analysis -- Shortest Path, Maximal Flow including PERT & CPM; Integer programming -- Basic Concept, Application, Formulation, Solution of IP; Dynamic programming-- Basic Concept, Modelling, Optimization & Replacement, Solution of DP; Game theory-- Basic Concept, Saddle Point, Dominance Rule, Convex Linear Combination, Method of Matrices, Graphical Solution; Queuing theory-- Queuing Model, Queuing Systemand Structure, Notation Parameter, Single Server & Multi Server Model, Poisson Input, Exponential Service, Constant Rate Service.

**Textbooks/ Reference Books:**


1. OPERATION RESEARCH---SD Sharma & Kedarnath
2. OPERATION RESEARCH---Hiller & Libermann
3. OPERATION RESEARCH---Wayne L Winston
4. OPERATION RESEARCH---V. K. Kapoor
5. OPERATION RESEARCH---Kanti Swaroop
6. OPTIMIZATION METHODS---Mittal
7. OPTIMIZATION METHODS ---Mustaf

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **MLC202106** | **Research Methodology and IPR** | **2-0-0** | **2** |

**Course Outcomes:**

At the end of this course, students will be able to

- Understand research problem formulation.
- Analyze research related information
- Follow research ethics
- Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
- Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

**Unit 1:**

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

**Unit 2:**

Effective literature studies approaches, analysis Plagiarism, Research ethics,

**Unit 3:**

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

**Unit 4:**

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

**Unit 5:**

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

**Unit 6:** New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

**References:**


- Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
- Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
- Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
- Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
- Mayall, "Industrial Design", McGraw Hill, 1992.
- Niebel, "Product Design", McGraw Hill, 1974.
- Asimov, "Introduction to Design", Prentice Hall, 1962.
- Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.
- T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **MAC202111** | **English for Research Paper Writing** | **2-0-0** | **0** |

**Course objectives:**

Students will be able to:

1. Understand that how to improve your writing skills and level of readability
2. Learn about what to write in each section
3. Understand the skills needed when writing a Title

Ensure the good quality of paper at very first-time submission

**Unit 1:**

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

**Unit 2:**

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

**Unit 3:**

Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

**Unit 4:**

Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,

**Unit 5:**

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

**Unit 6:**

Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

**Suggested Studies:**


1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **MAC202112** | **Disaster Management** | **2-0-0** | **0** |

**Course Objectives: -**Students will be able to:

1. learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2. critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
4. critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in

**Unit 1: Introduction**

Disaster: Definition, Factors and Significance; Difference Between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

**Unit 2: Repercussions of Disasters and Hazards**

Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.

**Unit 3: Disaster Prone Areas in India**

Study of Seismic Zones; Areas Prone to Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics

**Unit 4: Disaster Preparedness and Management**

Preparedness: Monitoring of Phenomena Triggering A Disaster or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And CommModuley Preparedness.

**Unit 5: Risk Assessment**

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.

**Unit 6: Disaster Mitigation**

Meaning, Concept and Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs Of Disaster Mitigation In India.

**SUGGESTED READINGS:**


1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.
2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L., Disaster Administration And Management Text And Case Studies",Deep &Deep Publication Pvt. Ltd., New Delhi.

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| MAC202113 | Sanskrit for Technical Knowledge | 2-0-0 | 0 |

**Objectives**

1. To get a working knowledge in illustrious Sanskrit, the scientific language in the world
2. Learning of Sanskrit to improve brain functioning
3. Learning of Sanskrit to develop the logic in mathematics, science & other subjects
4. enhancing the memory power
5. The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

**Course Output**

Students will be able to

1. Understanding basic Sanskrit language
2. Ancient Sanskrit literature about science & technology can be understood
3. Being a logical language will help to develop logic in students

**Unit 1:**

- Alphabets in Sanskrit,
- Past/Present/Future Tense,
- Simple Sentences

**Unit 2:**

- Order
- Introduction of roots
- Technical information about Sanskrit Literature

**Unit 3:**

- Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

**Suggested reading**


1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **MAC202114** | **Value Education** | **2-0-0** | **0** |

**Course Objectives**

Students will be able to

1. Understand value of education and self- development
2. Imbibe good values in students
3. Let they should know about the importance of character

**Course outcomes**

Students will be able to

1. Knowledge of self-development
2. Learn the importance of Human values
3. Developing the overall personality

**Unit 1:**

- Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism.
- Moral and non- moral valuation. Standards and principles.
- Value judgements

**Unit 2:**

- Importance of cultivation of values.
- Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness.
- Honesty, Humanity. Power of faith, National Moduley.
- Patriotism. Love for nature, Discipline

**Unit 3:**

- Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline.
- Punctuality, Love and Kindness.
- Avoid fault Thinking.
- Free from anger, Dignity of labour.
- Universal brotherhood and religious tolerance.
- True friendship.
- Happiness Vs suffering, love for truth.
- Aware of self-destructive habits.
- Association and Cooperation.
- Doing best for saving nature

**Unit 4:**

- Character and Competence –Holy books vs Blind faith.
- Self-management and Good health.
- Science of reincarnation.
- Equality, Nonviolence,Humility, Role of Women.

- All religions and same message. Mind your Mind, Self-control.
- Honesty, Studying effectively

**Suggested reading**

1. Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

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# ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

**Guwahati**

**Course Structure and Syllabus**
**(From Academic Session 2020-21 onwards)**

**M.Tech**
**CIVIL ENGINEERING**

**SPECIALIZATION: DESIGN OF CIVIL ENGINEERING STRUCTURES**

## 2nd Semester

# ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

## Guwahati

## Course Structure
**(From Academic Session 2020-21 onwards)**

**M.Tech: Civil Engineering**
**Specialization: Design of Civil Engineering Structures**
**2nd Semester**

| Theory/ Practical | Sl. No. | Sub Code | Subject | Hours Per week | | | Credit | Marks | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CE | ESE |
| **Core** | | | | | | | | | |
| Theory | 1 | CED202201 | Advanced Structural Design | 3 | 0 | 0 | 3 | 30 | 70 |
| | 2 | CED202202 | Soil Dynamics | 3 | 0 | 0 | 3 | 30 | 70 |
| | 3 | CED202203 | Finite Element Method | 3 | 0 | 0 | 3 | 30 | 70 |
| Practical | 1 | CED202214 | Computational Laboratory | 0 | 0 | 4 | 2 | 30 | 70 |
| **Program Elective-2** | | | | | | | | | |
| Theory | 1 | CED202PE2* | Program Elective-2 | 3 | 0 | 0 | 3 | 30 | 70 |
| **Program Elective-3** | | | | | | | | | |
| Theory | 1 | CED202PE3* | Program Elective-3 | 3 | 0 | 0 | 3 | 30 | 70 |
| **Audit Course-2** | | | | | | | | | |
| Theory | 1 | MAC20222* | Audit Course-2 | 2 | 0 | 0 | 0 | - | 100 |
| Total | | | | **17** | **0** | **4** | **17** | **180** | **520** |
| **Total contact hours per week: 21**<br>**Total Credit**: **17** | | | | | | | | | |

**Program Elective-2**

| Sl No | Code | Subject |
|---|---|---|
| 1 | CED202PE21 | Design of Hydraulic Structure |
| 2 | CED202PE22 | Advance Geotechnical Engineering |
| 3 | CED202PE23 | Design of Underground Excavations |
| 4 | CED202PE2* | Any other subject offered from time to time with the approval of the University |

**Program Elective-3**

| Sl No | Code | Subject |
|---|---|---|
| 1 | CED202PE31 | Ground Improvement Techniques |
| 2 | CED202PE32 | Analysis and Design of Bridges |
| 3 | CED202PE33 | Plates, Shells and Elastic Stability |
| 4 | CED202PE3* | Any other subject offered from time to time with the approval of the University |

**Audit Course-2**

| Sl No | Code | Subject |
|---|---|---|
| 1 | MAC202221 | Constitution of India |
| 2 | MAC202222 | Pedagogy Studies |
| 3 | MAC202223 | Stress Management by Yoga |
| 4 | MAC202224 | Personality Development through Life Enlightenment Skills |
| 5 | MAC20222* | Any other subject offered from time to time with the approval of the University |

**Detailed Syllabus:**

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **CED202201** | **Advanced Structural Design** | **3-0-0** | **3** |

Design philosophy, modeling of loads, material characteristics. Reinforced Concrete -- P-M, M-phi relationships; strut-and-tie method; design of deep beam and corbel; design of shear walls; compression field theory for shear design; design against torsion; Indian and ACI Standards; Eurocode. Steel structures -- stability design; torsional buckling (pure, flexural and lateral); design of beam-columns; fatigue resistant design; Indian and AISC Standards; Eurocode.

**Texts**

1. S.U. Pillai and D. Menon, Reinforced Concrete Design, Tata McGraw-Hill, 3rd Ed, 1999.
2. N. Subramaniam, Design of Steel Structures, Oxford University Press, 2008.

**References**

1. S. Chandrasekaran, L. Nunziante, G. Serino and F. Carannante, Seismic Design Aids for Nonlinear Analysis of Reinforced Concrete Structures, Taylor and Francis, 2010.
2. R. Ranganathan, Structural Reliability: Analysis and Design, Jaico Publishers, 1999.
3. R. Park and T. Paulay, Reinforced Concrete Structures, John Wiley & Sons, 1995.
4. P.C. Varghese, Advanced Reinforced Concrete Design, Prentice Hall of India, 2nd Ed, 2005.
5. C-K Wang, C.H. Solomon and J. A. Pincheira, Reinforced Concrete Design, John Wiley and Sons, 7th Ed, 2007.
6. J.G. MacGregor and J.K. Wight, Reinforced Concrete: Mechanics and Design, Pearson Education, 5th Ed, 2008.
7. T.T.C. Hsu and Y.L. Mo, Unified Theory of Concrete Structures, John Wiley & Sons, 2010.
8. C.G. Salmon, J.E. Johnson and F.A. Malhas, Steel Structures Design and Behavior Emphasizing Load and Resistance Factor Design, Pearson Education, 5th Ed, 2009.
9. IS 456: 2000 – Plain and Reinforced Concrete – Code of Practice, Bureau of Indian Standards, 2000.
10. SP 34: 1987 – Handbook of Concrete reinforcement and Detailing, Bureau of Indian Standards, 1987.
11. IS 800: 2007 – General Construction in Steel - Code of Practice, Bureau of Indian Standards, 2007.
12. ACI 318:2008 – Building Code Requirements for Structural Concrete, American Concrete Institute, 2008.
13. Specification for Structural Steel Buildings, American Institute of Steel Construction,2005.
14. Eurocode 2 Part 1-1, BS EN 1992-1-1 Common Rules for Buildings and Civil Engineering Structures, The Institution of Structural Engineers, 2004.
15. Eurocode 3 Part 1-1, BS EN 1993-1-1 Design of Steel Structures General Rules and Rules for Buildings, The Institution of Structural Engineers, 2004.

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **CED202202** | **Soil Dynamics** | **3-0-0** | **3** |

**Introduction:** Earthquake loading, Equivalent dynamic load to an actual earthquake load, seismic force for pseudo-static analysis; Dynamic soil properties: General, Laboratory techniques, field tests, factor affecting shear modulus, elastic modulus and elastic constants. Dynamic earth pressure: General, pseudo-static methods, displacements methods, numerical problems. Seismic stability analysis of slopes: General, pseudo-static analysis, displacement analysis, numerical problems.

**Liquefaction of soils:** Definitions, mechanism of liquefaction, standard curves and correlations for liquefactions, evaluation of zone of liquefaction in field, factors affecting liquefaction, anti-liquefaction measures. Machine foundations, types and basic requirements, analysis and design of foundations for reciprocating and impact type machines.

**Text/References**:

1. Prakash, S., Soil Dynamics, McGraw Hill, 1981.
2. Swmai Saran, Soil Dynamics and machine foundations, Galgotia production, 2010.
3. S.L. Kramer, Geotechnical and earthquake engineering, Pearson Education

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **CED202203** | **Finite Element Method** | **3-0-0** | **3** |

Introduction to FEM; governing equation and its solution approximations (e.g. Collocation, Least Squares, Galerkin's method, the Ritz method); introduction to calculus of variations; concept of discretization of structures and shape functions; Lagrangian and serendipity elements; isoparametric formulation. Analysis of framed structures: plane stress and plane strain problems; axisymmetric problems; 3D stress analysis; analysis of plate and shell. Numerical integration and order of integration: error analysis and convergence; computer implementations of algorithms. Application of FEM in dynamics: eigenvalues and orthogonality.

**Textbooks/ Reference Books:**


1. J.N. Reddy, An Introduction to the Finite Element Method, Tata McGraw Hill, 2nd Ed, 2003.
2. C.S. Krishnamoorthy, Finite Elements Analysis: Theory and Programming, Tata McGraw Hill, 2nd Ed, 1994.
3. R.D. Cook, D.S. Malkus and M.E. Plesha, Concepts and Applications of Finite Element Analysis, John Wiley & Sons, 4th Ed, 2002.
4. O.C. Zienkiewicz, R.L. Taylor and J.Z. Zhu, Finite Element Method Its Basis and Fundamentals, Elsevier, 6th Ed, 2005.
5. S.S. Rao, Finite Element Method in Engineering, Butterworth Heinemann, 3rd Ed, 1999.
6. M.B. Kanchi, Matrix Method of Structural Analysis, Wiley Eastern Limited, 2nd Ed, 1993.
7. K.J. Bathe, Finite Element Procedures, Prentice Hall of India Pvt. Ltd., 2002.

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **CED202214** | **Computational Laboratory** | **0-0-4** | **2** |

Introduction to finite element and finite difference methods, Introduction to various software like ANSYS, FLAC and SAP, ETABS etc. Application of these softwares.

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **CED202PE21** | **Design of Hydraulic Structure** | **3-0-0** | **3** |

Weirs and Barrages - Causes of failure by piping and by direct uplift, Bligh's creep theory for seepage flow, Khosla's theory and concept of Flownet. Determination of uplift pressure below composite weir profile adopting Schwarz christoffel transformation by Khosla's method of design. Principle for weirs on permeable foundation. Factors governing the design of the weir or a barrage. Design of weirs and barrages using Khosla's theory of independent variables.

Dam - Types, Forces acting on each type. Design of gravity dams (elementary and practical profile) , Design of Arch dam by thin cylinder method, earth dam and its failure, seepage analysis in earth dam.

Spillways - Locations, types, ogee spillway, comprehensive profile for ogee spillway, predictions of super critical flow at the foot of the spill way, factors affecting discharge coefficient for ogee spillway. Side channel spillway – dynamic equation for spatially varied flow, hinged solution. Design of side channel spillway. Introduction to design principle of Chute Spillway, siphon spillway and shaft spillway.

Energy Dissipator - Energy dissipater for different tailwater conditions. Various of stilling basin. Design of type – II stilling basin. Skyjump bucket and roller bucket. Surge Tank - Unsteady flow in closed conduit, basic differential water hammer wave equation, stability of surge tank, Thoma formula.

**Text/References:**


1. Irrigation and Hydralulic Structure - S.K.Garg
2. Design of Small Dam - U.S.B.R.
3. Irrigation and Water Power Engineering - P.N.Modi.
4. Flow in Open Channel - Subramanya

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **CED202PE22** | **Advance Geotechnical Engineering** | **3-0-0** | **3** |

Fundamental aspects of soil mechanics, characteristics of soil, particulate nature, weight volume relationship; Flow of water through soils, permeability, flownets; Theory of elasticity, few aspects of elasticity, plane stress and plane strain problems; Pore water pressure, undrained loading, determination of pore water pressure parameters; Consolidation, Terzaghi's 1-D consolidation theory, layered soils, time dependent loading, 2-D problems, 3-D consolidation (axisymmetric problems, vertical drains), creep/secondary consolidation and basic of rheological models; Shear strength, stresses in soils, Mohr's circle, stress paths, UU, CU, CD tests, drained and undrained stress-strain relationships and shear strength; Critical state theory, normal consolidation line, critical state line, Roscoe surface, Hvorslev surface, no tension line; Constitutive laws for soil.

**Textbooks/ Reference Books:**


1. Das, Braja, M., "Advanced Soil Mechanics", Taylor & Francis 1983 2.
2. Lambe, T. William and Whitman, Robert V., "Soil Mechanics", John Wiley. 2000
3. Craig, R.F., "Soil Mechanics", Chapman & Hall. 1993
4. Suklje, L., "Rheological Aspects of Soil Mechanics", John Wiley. 1969
5. Terzaghi, K. and Peck, R.B., "Soil Mechanics in Engineering Practice", John Wiley. 1967
6. Davis, R.O. and Selvadurai, E.P.S. "Elasticity and Geomechanics", Cambridge University Press

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **CED202PE23** | **Design of Underground Excavations** | **3-0-0** | **3** |

Introduction, planning of and exploration for various underground construction projects; Stereographic projection method, principle and its application in underground excavation design; Elastic stress distribution around tunnels, stress distribution for different shapes and under different in-situ stress conditions, Greenspan method, design principles, multiple openings, openings in laminated rocks, elasto-plastic analysis of tunnels, Daemen's theory; Application of rock mass classification systems, ground conditions in tunneling, analysis of underground openings in squeezing and swelling ground, empirical methods, estimation of elastic modulus and modulus of deformation of rocks; uniaxial jacking / plate jacking tests, radial jacking and Goodman jacking tests, long term behaviour of tunnels and caverns, New Austrian Tunneling Method (NATM), Norwegian Tunneling Method (NTM), construction dewatering; Rock mass-tunnel support interaction analysis, ground response and support reaction curves, Ladanyi's elasto-plastic analysis of tunnels, design of various support systems including concrete and shotcrete linings, steel sets, rock bolting and rock anchoring, combined support systems, estimation of load carrying capacity of rock bolts; In-situ stress, flat jack, hydraulic fracturing and over coring techniques and USBM type drill hole deformation gauge, single and multi-point bore hole extensometers, load cells, pressure cells, etc; Instrumentation and monitoring of underground excavations, during and after construction, various case studies

**Textbooks/ Reference Books:**


1. Hoek, E and and Brown, E. T.," Underground Excavations in Rocks", Institute of Mining Engineering. 1983
2. Obert, L. and Duvall, W.I., "Rock Mechanics and Design of Structures in Rocks", John Wiley. 1967
3. Singh, B. and Goel, R.K.,"Rock Mass Classification- A Practical Engineering Approach", Elsevier. 2006
4. Singh, B. and Goel, R.K., "Tunnelling in Weak Rocks", Elsevier. 2006 5. Ramamurthy, T., "Engineering in Rocks", PHI Learning. 2008

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **CED202PE31** | **Ground Improvement Techniques** | **3-0-0** | **3** |

Site investigation and subsoil exploration; Methods of boring and sampling; Field tests; Engineering properties of soft, weak and compressible deposits; Principles of treatment; Methods of soil improvement; Dynamic compaction; Preloading; Vertical drains; Granular piles; Lime stabilization and injection; Grouting; Soil nailing; Anchors; Vacuum consolidation; Thermal, electrical and chemical methods; Case histories.

**Textbooks/References**


1. Bowles, J.E., Foundation Analysis and Design, McGraw-Hill International Edition, 1997.
2. Hausmann, M.R., Engineering Principles of Ground Modification, McGraw-Hill International Editions, 1990.
3. Yonekura, R., Terashi, M. and Shibazaki, M. (Eds.), Grouting and Deep Mixing, A.A. Balkema, 1966.
4. Moseley, M.P., Ground Improvement, Blackie Academic & Professional, 1993. 5. Xanthakos, P.P., Abramson, L.W. and Bruce, D.A., Ground Control and Improvement, John Wiley & Sons, 1994.

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **CED202PE32** | **Analysis and Design of Bridges** | **3-0-0** | **3** |

Types of bridges; structural configurations; bridge loading standards in India and other countries (IRC, IRS and AASHTO guidelines); Impact effect; Standard specifications for road and railway bridges; analysis of bridge deck. Reinforced concrete bridges -- design of deck slab; T-beam bridge; balanced cantilever type; design and details of articulation. Prestressed concrete bridges -- Pretensioned and post tensioned concrete bridges; analysis of section for flexure, shear and bond; losses in prestress, deflection of girder; partial prestressing; analysis and design of anchorage block; box girder bridge. Steel bridges -- steel-concrete composite constructions, shear connectors and their design; types of bearings and layout. Abutment and piers -- scour at abutment and piers; types of foundations; analysis for stresses and design; introduction to soil-structure interaction. Numerical modeling and analysis; introduction to earthquake resistant design of bridges.

**Texts/ References**


1. D. J. Victor, Essentials of Bridge Engineering, Oxford IBH, 1980.
2. V. K. Raina, Concrete Bridge Practice Analysis Design and Economics, Tata McGraw Hill, 2nd Ed, 1994.
3. N. Rajagopalan, Bridge Superstructure, Narosa Publishing House, 2006.
4. W. F. Chen and L. Duan, Bridge Engineering Handbook, CRC press, 2003.
5. B. Bakht and L.G. Jaeger, Bridge Analysis Simplified, McGraw Hill, 1987.
6. E. J. O'Brien, and D. L. Keogh, Bridge Deck Analysis, Taylor and Francis, 1999.
7. H. Eggert and W. Kauschke, Structural Bearings, Ernst & Sohn, 2002.
8. T. Y. Lin and N. H. Burns, Design of Prestressed Concrete Structures, John Wiley and Sons, 1981.
9. L. Fryba, Dynamics of Railway Bridges, Thomas Telford, 1996.

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **CED202PE33** | **Plates, Shells and Elastic Stability** | **3-0-0** | **3** |

Bending of thin plates --- assumptions; governing differential equations in Cartesian coordinate system; boundary conditions; analytical solutions for rectangular plates by Navier and Levy's methods; distributed and concentrated loads; Circular plates: governing differential equations in polar coordinate system, annular plate, rotationally symmetric loading, eccentric concentrated load; simultaneous bending and stretching of thin plates; introduction to large deflection theory of plates. Shells --- geometry and classifications; stress resultants; membrane theory and its applications to shells of surface of revolutions; membrane theory for cylindrical shell; general theory in bending of cylindrical shell; simplified method for cylindrical shell. Elastic stability of columns --- eigenvalue problem; buckling modes and critical load; beam columns; beam-columns with elastic restraints; effect of initial curvature; buckling of bar on elastic foundation; buckling of frames; inelastic stability; lateral buckling of beams in pure bending; torsional buckling; combined flexural-torsional buckling. Buckling of thin plates; rectangular plates under uniaxial and biaxial compression; combined bending and compression; shear bucking; application of energy methods for calculation of buckling loads and modes.

**Texts/References**


1. G. S. Ramaswami, Design and Construction of Concrete Shell Roofs, CBS Publishers, New Delhi, 2004.
2. M. L. Gambhir, Stability Analysis and Design of Structure, Springer, 2009.
3. S. P. Timoshenko and W. W. Krieger, Theory of Plates and Shells, McGraw Hill, 2nd Ed, 1964.
4. R. Szilard, Theory and Analysis of Plates - Classical and Numerical Methods, John Wiley and Sons, 2004.
5. A. Zingoni, Shell Structures in Civil and Mechanical Engineering, Thomas Telford, 1997.
6. S. P. Timoshenko and J. M. Gere, Theory of Elastic Stability, Dover Publications, 2nd Ed, 2009.
7. A. Chajes, Principles of Structural Stability Theory, Pearson Education Limited, 1993.

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| MAC202221 | Constitution of India | 2-0-0 | 2 |

**Course Objectives:**

Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

**Unit 1: History of Making of the Indian Constitution (4Lectures)**

History, Drafting Committee, (Composition & Working)

**Unit 2: Philosophy of the Indian Constitution (4 Lectures)**

Preamble, Salient Features

**Unit 3: Contours of Constitutional Rights & Duties (4 Lectures)**

- Fundamental Rights
- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies  Directive Principles of State Policy
- Fundamental Duties

**Unit 4: Organs of Governance (4 Lectures)**

- Parliament
- Composition
- Qualifications and Disqualifications
- Powers and Functions
- Executive
- President
- Governor
- Council of Ministers
- Judiciary, Appointment and Transfer of Judges, Qualifications
- Powers and Functions

**Unit 5: Local Administration (4 Lectures)**

- District's Administration head: Role and Importance,
- Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation.
- Pachayati raj: Introduction, PRI: ZilaPachayat.
- Elected officials and their roles, CEO ZilaPachayat: Position and role.
- Block level: Organizational Hierarchy (Different departments),
- Village level: Role of Elected and Appointed officials
- Importance of grass root democracy

**Unit 6: Election Commission (4 Lectures)**

- Election Commission: Role and Functioning.
- Chief Election Commissioner and Election Commissioners.
- State Election Commission: Role and Functioning.
- Institute and Bodies for the welfare of SC/ST/OBC and women

**Suggested reading**


1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.


**Course Outcomes:**

**Students will be able to:**

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the passage of the Hindu Code Bill of 1956.

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **MAC202222** | **Pedagogy Studies** | **2-0-0** | **0** |

**Course Objectives:**

Students will be able to:

1. Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
2. Identify critical evidence gaps to guide the development.

**Unit 1: Introduction and Methodology (4 Lectures)**

- Aims and rationale, Policy background, Conceptual framework and terminology  Theories of learning, Curriculum, Teacher education.
- Conceptual framework, Research questions**.**
- Overview of methodology and Searching

**Unit 2: (2 Lectures)**

- Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries.
- Curriculum, Teacher education.

**Unit 3: (4 Lectures)**

- Evidence on the effectiveness of pedagogical practices
- Methodology for the in depth stage: quality assessment of included studies.
- How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?
- Theory of change.
- Strength and nature of the body of evidence for effective pedagogical practices.
- Pedagogic theory and pedagogical approaches.
- Teachers' attitudes and beliefs and Pedagogic strategies.

**Unit 4: (4 Lectures)**

- Professional development: alignment with classroom practices and follow-up support
- Peer support
- Support from the head teacher and the community.
- Curriculum and assessment
- Barriers to learning: limited resources and large class sizes

**Unit 5: Research gaps and future directions (2 Lectures)**

- Research design
- Contexts
- Pedagogy
- Teacher education
- Curriculum and assessment
- Dissemination and research impact

**Suggested reading**


1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.


**Course Outcomes:**

Students will be able to understand:

1. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
3. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **MAC202223** | **Stress Management by Yoga** | **2-0-0** | **0** |

**Course Objectives**

1. To achieve overall health of body and mind
2. To overcome stress

**Unit 1: Definitions of Eight parts of yog. ( Ashtanga ) (8 Lectures)**

**Unit 2: Yam and Niyam (2 Lectures)**

Do`s and Don't's in life.

i) Ahinsa, satya, astheya, bramhacharya and aparigraha
ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

**Unit 3: Asan and Pranayam (2 Lectures)**

i) Various yog poses and their benefits for mind & body
ii) Regularization of breathing techniques and its effects-Types of pranayam

| Course Code | Course Title | Hours per week L-T-P | Credit C |
|---|---|---|---|
| **MAC202224** | **Personality Development through Life Enlightenment Skills** | **2-0-0** | **0** |

**Course Objectives:**

1. To learn to achieve the highest goal happily
2. To become a person with stable mind, pleasing personality and determination
3. To awaken wisdom in students

**Unit 1: Neetisatakam-Holistic development of personality (8 Lectures)**

- Verses- 19,20,21,22 (wisdom)
- Verses- 29,31,32 (pride & heroism)
- Verses- 26,28,63,65 (virtue)
- Verses- 52,53,59 (dont's)
- Verses- 71,73,75,78 (do's)

**Unit: 2 (8 Lectures)**

- Approach to day to day work and duties.
- Shrimad Bhagwad Geeta : Chapter 2-Verses 41, 47,48,
- Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,
- Chapter 18-Verses 45, 46, 48.

**Unit 3: (8 Lectures)**

- Statements of basic knowledge.
- Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68
- Chapter 12 -Verses 13, 14, 15, 16,17, 18
- Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
- Chapter 4-Verses 18, 38,39
- Chapter18 – Verses 37,38,63

**SUGGESTED READING:**

1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi

***Course Outcome:***

Students will be able to

1. Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
2. The person who has studied Geeta will lead the nation and mankind to peace and prosperity
3. Study of Neetishatakam will help in developing versatile personality of students.

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# ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

**Guwahati**

**Course Structure and Syllabus**
**(From Academic Session 2020-21 onwards)**

**M.Tech**

**CIVIL ENGINEERING**
**SPECIALIZATION: DESIGN OF CIVIL ENGINEERING STRUCTURES**

## 3rd Semester

# ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

## Guwahati

## Course Structure
## (From Academic Session 2020-21 onwards)

## M. Tech: Design of Civil Engineering Structures

## 3rd Semester: Course Structure

| Theory/ Practical | Sl. No. | Sub Code | Subject | Hours Per week | | | Credit | Marks | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CE | ESE |
| **Core** | | | | | | | | | |
| Practical | 1 | CED202321 | Mini Project | 0 | 0 | 8 | 4 | 50 | 50 |
| | 2 | CED202322 | Dissertation Phase – I | 0 | 0 | 24 | 12 | 50 | 50 |
| Total | | | | **0** | **0** | **32** | **16** | **100** | **100** |
| **Total contact hours per week: 32**<br>**Total Credit**: 1**6** | | | | | | | | | |

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# ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

**Guwahati**

**Course Structure and Syllabus**
**(From Academic Session 2020-21 onwards)**

**M.Tech**

**CIVIL ENGINEERING**
**SPECIALIZATION: DESIGN OF CIVIL ENGINEERING STRUCTURES**

## 4th Semester

# ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

## Guwahati

## Course Structure
## (From Academic Session 2020-21 onwards)

## M. Tech: Design of Civil Engineering Structures

## 4th Semester: Course Structure

| Theory/ Practical | Sl. No. | Sub Code | Subject | Hours Per week | | | Credit | Marks | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CE | ESE |
| **Core** | | | | | | | | | |
| Practical | 1 | CED202421 | Dissertation Phase – II | 0 | 0 | 32 | 16 | 50 | 50 |
| Total | | | | **0** | **0** | **32** | **16** | **50** | **50** |
| **Total contact hours per week: 32**<br>**Total Credit: 16** | | | | | | | | | |

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