**Walchand College of Engineering, Sangli**
*(Government Aided Autonomous Institute)*

**AY 2021-22**

**Course Information**

| | |
|---|---|
| **Programme** | M. Tech (CS and IT) |
| **Class, Semester** | Second Year M. Tech., Sem III |
| **Course Code** | 5IT601 |
| **Course Name** | Legal, Financial Aspects of Industrial Project |
| **Desired Requisites:** | |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 2 Hrs/week | **T1** | **T2** | **ESE** | **Total** |
| **Tutorial** | - | 20 | 20 | 60 | 100 |
| **Practical** | - | | | | |
| **Interaction** | - | **Credits: 2** | | | |

**Course Objectives**

| | |
|---|---|
| **1** | To elaborate the fundamental aspects of Intellectual property Rights |
| **2** | To realize cyber activities, crimes and legal perspectives |
| **3** | To illustrate Intellectual Property Right and Information Technology acts |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

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

| | | |
|---|---|---|
| **CO1** | Illustrate the significance of copyright, patents, designs and trademarks | Apply |
| **CO2** | Evaluate the social impact of intellectual property law and policy | Evaluate |
| **CO3** | Analyze ethical and professional practices in the intellectual property | Analyze |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Fundamentals of IPR**: Introduction to Intellectual Property right (IPR), Types of IPR, Nature of protection of IP | 4 |
| II | **Patent and patentability:** Patentability Criteria, Rights of patentee, patent Infringement, Compulsory Licensing | 4 |
| III | **Copyright:** Trademark, Designs and Geographical Indication | 4 |
| IV | **Intellectual Property Rights:** Introduction to Intellectual Property Law; Indian Patents Act, 1970 | 4 |
| V | **Security:** Computer and crime, computer Security and IP, | 5 |
| VI | **Cyber Laws:** Introduction to Indian Cyber Law, The Information Technology Act, 2000 | 5 |

**Text Books**

| | |
|---|---|
| 1 | K. D. Raju, *"The Intellectual Property Rights & Competition Law : A Comparative Analysis"*, Eastern Law House, 2015 |
| 2 | Howard B. Rockman, *"Intellectual Property Law for Engineers and Scientists"*, Wiley, 2004 |
| 3 | Idris, K., *"Intellectual property: a power tool for economic growth"*, 2nd Edition, WIPO publication no. 888,Switzerland, 2003 |
| 4 | Vivek Sood , *"Cyber Law Simplified"*, Tata McGraw-Hill Publishing Company, 2001 |

**References**

| | |
|---|---|
| 1 | Narayanan, V. K., *"Managing technology and innovation for competitive advantage"*, 1st Edition, Pearson education, New Delhi, 2006 |
| 2 | Jeffrey Sheldon,*"How to Write a Patent Application"*, 3rd Edition, Practising Law Institute, 2016. |
| 3 | Vakul Sharma, *"Information Technology Law and Practice"*, Universal Law Publishing, 2011 |
| 4 | Pavan Duggal, *"Cyberlaw - The Indian Perspective"*, Saakshar Law Publications,2002 |

**Useful Links**

| | |
|---|---|
| 1 | https://nptel.ac.in/courses/110/105/110105140/ (For module 2) |
| 2 | https://nptel.ac.in/courses/110/105/110105139/ (For module 3) |

| | |
|---|---|
| 3 | https://nptel.ac.in/courses/127/105/127105008/ (For module 1 to 4) |
| 4 | https://ipindia.gov.in/acts-patents.htm |
| 5 | https://www.meity.gov.in/content/information-technology-act-2000 |

| **CO-PO Mapping** | | | | | | |
|---|---|---|---|---|---|---|
| **Programme Outcomes (PO)** | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| **CO1** | 2 | | 2 | | | |
| **CO2** | | 3 | | 2 | | |
| **CO3** | 3 | | | | 1 | |

| **Assessment** |
|---|
| The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6. |

| **Assessment Plan based on Bloom's Taxonomy Level** | | | | |
|---|---|---|---|---|
| **Bloom's Taxonomy Level** | **T1** | **T2** | **ESE** | **Total** |
| Remember | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Understand | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Apply | 10 | 10 | 20 | **40** |
| Analyze | 5 | 5 | 15 | **25** |
| Evaluate | 5 | 5 | 15 | **25** |
| Create | | | 10 | **10** |
| **Total** | **20** | **20** | **60** | **100** |

**Walchand College of Engineering, Sangli**
*(Government Aided Autonomous Institute)*

**AY 2021-22**

| **Course Information** | |
|---|---|
| **Programme** | M. Tech (CS and IT) |
| **Class, Semester** | Second Year M. Tech., Sem III |
| **Course Code** | 5IT690 |
| **Course Name** | Dissertation Phase I |
| **Desired Requisites:** | |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | - | **LA1** | **LA2** | **Lab ESE** | **Total** |
| **Tutorial** | - | 30 | 30 | 40 | 100 |
| **Practical** | 20 Hrs/Week | | | | |
| **Interaction** | - | **Credits: 10** | | | |

**Course Objectives**

| | |
|---|---|
| **1** | To instruct factual knowledge, recent methods and trends for dissertation |
| **2** | To compare the rigorous literature in research domain |
| **3** | To select the publication platform form to communicate the research |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

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

| | | |
|---|---|---|
| **CO1** | Apply theoretical frameworks to the appropriate area of research | Apply |
| **CO2** | Construct mathematical model for the dissertation | Apply |
| **CO3** | Analyze and synthesize research gap for engineering problem | Analyze |

**List of Experiments / Lab Activities**

**List of Experiments:**

Following activities are to be carried out in dissertation:

1. Literature Survey: Detailed summarized literature survey from valid sources and gap Analysis. Research Objectives: Deeply and precisely stated objectives, novel methodologies to address the dissertation work.
2. Significance and scope: Comprehensive topic with full of exploration at each level, importance, challenges and expected outcomes
3. Synopsis: Technical write up and requirement analysis to achieve defined objectives and its implementation
4. Publications: Review/survey paper in standard publications.
5. Report writing: Proper citation of sources, organized section of chapters, standard and valid references, nearly absolute contents
6. The work should be completed in all aspects of design, implementation and testing and follow software engineering practices
7. Dissertation reports should be prepared and submitted in soft and hard form al ong with the code and other dependency documents. Preferable use online code repositories (github/bitbucket)

Dissertation report (pre-defined template) should be prepared using Latex/Word and submitted along with soft copy on CD/DVD (with code, PPT, PDF, Text report document & reference material) or on an online repository.

**Text Books**

| | |
|---|---|
| 1 | Rajendra Kumbhar , "*How to Write Project Reports, Ph. D. Thesis and Research Articles*", Universal Prakashan, 2015 |
| 2 | Marilyn Deegan, " *Academic Book of the Future Project Report*", A Report to the AHRC & the British Library, 2017 |

**References**

| | |
|---|---|
| 1 | Research journals from IEEE, ACM, Elsevier, Springer, Science Direct etc. |

**Useful Links**

| | |
|---|---|
| 1 | https://ieeexplore.ieee.org/Xplore/home.jsp |
| 2 | https://www.sciencedirect.com |

| | |
|---|---|
| 3 | https://www.researchgate.net |

| CO-PO Mapping | | | | | | |
|---|---|---|---|---|---|---|
| **Programme Outcomes (PO)** | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| **CO1** | 3 | | 2 | | | |
| **CO2** | | 2 | | 1 | | |
| **CO3** | | 1 | | | 1 | |

**Assessment**

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

| Assessment | Based on | Conducted by | Typical Schedule (for 26-week Sem) | Marks |
|---|---|---|---|---|
| LA1 | Lab activities, attendance, journal | Lab Course Faculty | During Week 1 to Week 6<br>Marks Submission at the end of Week 6 | 30 |
| LA2 | Lab activities, attendance, journal | Lab Course Faculty | During Week 7 to Week 12<br>Marks Submission at the end of Week 12 | 30 |
| Lab ESE | Lab activities, attendance, journal | Lab Course Faculty | During Week 15 to Week 18<br>Marks Submission at the end of Week 18 | 40 |

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

| Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses) | | | | |
|---|---|---|---|---|
| **Bloom's Taxonomy Level** | **LA1** | **LA2** | **Lab ESE** | **Total** |
| Remember | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Understand | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Apply | 10 | 10 | 10 | **30** |
| Analyze | 10 | 10 | 10 | **30** |
| Evaluate | 5 | 5 | 10 | **20** |
| Create | 5 | 5 | 10 | **20** |
| **Total Marks** | **30** | **30** | **40** | **100** |

**Walchand College of Engineering, Sangli**
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**AY 2021-22**

**Course Information**

| | |
|---|---|
| **Programme** | M. Tech (CS and IT) |
| **Class, Semester** | Second Year M. Tech., Sem III |
| **Course Code** | 5IT611 |
| **Course Name** | Professional Elective – 5: Parallel Algorithms |
| **Desired Requisites:** | Computer Algorithm |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 2 Hrs/week | **T1** | **T2** | **ESE** | **Total** |
| **Tutorial** | - | 20 | 20 | 60 | 100 |
| **Practical** | - | | | | |
| **Interaction** | - | **Credits: 2** | | | |

**Course Objectives**

| | |
|---|---|
| **1** | To experiment the parallel architecture in Parallel Algorithms |
| **2** | To use the process of parallelization in computer algorithms |
| **3** | To compare the thread and process parallel architecture |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

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

| | | |
|---|---|---|
| **CO1** | Implement the sequential and parallel algorithms | Apply |
| **CO2** | Compare the speedup factor of sequential and parallel algorithms | Analyze |
| **CO3** | Design the parallel algorithm to improve the performance parameters | Create |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | Parallel Computing: Motivation and scope | 6 |
| II | GPGPU Programming : OpenACC, CUDA, OpenCL | 4 |
| III | Trends in processor architecture and limitations of memory systems | 4 |
| IV | Dichotomy and organization of parallel platforms | 4 |
| V | Communication costs in parallel machines | 4 |
| VI | Routing mechanism and processor mapping techniques | 4 |

**Text Books**

| | |
|---|---|
| 1 | Anath Grama, Ansul Gupta, George Karypis, Vipin Kumar, *"Introduction to parallel computing",* Second Edition, Pearson Education, 2003 |
| 2 | Jaegeun Han, Bharatkumar Sharma, *"Learn CUDA Programming",* First Edition, Packt publishing, 2019 |

**References**

| | |
|---|---|
| 1 | Horrowitz, Sahni Rajasekaran, "Computer Algorithms", Computer Science, W. H. Freeman and company Press, New york |

**Useful Links**

| | |
|---|---|
| 1 | https://nptel.ac.in/courses/106/102/106102114/ |
| 2 | https://nptel.ac.in/courses/106/102/106102163/ |

**CO-PO Mapping**

| | **Programme Outcomes (PO)** | | | | | |
|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| **CO1** | 2 | | | 3 | | |
| **CO2** | | 2 | | | 1 | |
| **CO3** | | | 1 | 1 | | |

| Assessment |
| --- |
| The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6. |

| Assessment Plan based on Bloom's Taxonomy Level | | | | |
| --- | --- | --- | --- | --- |
| **Bloom's Taxonomy Level** | **T1** | **T2** | **ESE** | **Total** |
| Remember | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Understand | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Apply | 10 | 10 | 20 | **40** |
| Analyze | 5 | 5 | 15 | **25** |
| Evaluate | 5 | 5 | 15 | **25** |
| Create | | | 10 | **10** |
| **Total** | **20** | **20** | **60** | **100** |

**Walchand College of Engineering, Sangli**
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**AY 2021-22**

**Course Information**

| | |
|---|---|
| **Programme** | M. Tech. (CS and IT) |
| **Class, Semester** | Second Year M. Tech., Sem IV |
| **Course Code** | 5IT612 |
| **Course Name** | Professional Elective – 6: Software Reliability and Testing |
| **Desired Requisites:** | Software Engineering |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 3 Hrs/week | **T1** | **T2** | **ESE** | **Total** |
| **Tutorial** | - | 20 | 20 | 60 | 100 |
| **Practical** | - | | | | |
| **Interaction** | - | **Credits: 3** | | | |

**Course Objectives**

| | |
|---|---|
| **1** | To elaborate Software Reliability and Testing. |
| **2** | To illustrate project management cycle for software development. |
| **3** | To use Agile development techniques for software development. |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

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

| | | |
|---|---|---|
| **CO1** | Apply concepts of Software Reliability and Testing | Understand |
| **CO2** | Analyze Software Reliability Growth Models in Software Development | Analyze |
| **CO3** | Evaluate the Software system to detect fault tolerance | Analyze |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Basic of Software Testing:** Software Testing, Testing types, Flow graph, Cyclomatic complexity, Graph Matrices, Debugging & Test Case Strategies | 7 |
| II | **Software Quality:** Software Quality Assurance, Software Reuse, Documentation Requirements, Standards, Software Configuration Management, Version Control, Baselines | 7 |
| III | **Software Reliability:** Software Reliability, Software Reliability Issues, Statistical Testing and Software Quality Management, ISO 9000, Case Tools, Characteristics of Case Tools | 7 |
| IV | **User Interface and Design**: Concept of user Interface and Design, Types of user Interface, Component Based GUI Development | 7 |
| V | **Software Fault Detection:** Basic terminology of Fault tolerant, Fault detection using fault tree, Fault tolerant in SRE, Techniques for Fault tolerant: Recovery blocks, N- version programming | 5 |
| VI | **Software Fault Analysis:** Fault tree modelling, Fault tree analysis, Analysis of fault tolerant software system, Quantitative analysis of fault tolerant system | 6 |

**Text Books**

| | |
|---|---|
| 1 | Jalote Pankaj, *"An Integrated Approach to Software Engineering",* Narosa Publication, 3rd Edition, 2010. |
| 2 | Sommerville, *"Software Engineering"*, Pearson Education India, New Delhi,2nd Edition, 2006 |

**References**

| | |
|---|---|
| 1 | Musa John D., *"Software Reliability Engineering"*, Tata McGraw Hill, 2nd Edition, 1999 |

| | |
|---|---|
| 2 | Lyu, *"Software Reliability Engineering"*, IEEE Computer Society Press, 1st Edition, 1996 |
| | |

| **Useful Links** | |
|---|---|
| 1 | Module I, II, III, IV, V - https://onlinecourses.nptel.ac.in/noc21_cs15/preview |

| **CO-PO Mapping** | | | | | | |
|---|---|---|---|---|---|---|
| **Programme Outcomes (PO)** | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| **CO1** | 2 | | 2 | 1 | | |
| **CO2** | 1 | | | | | 2 |
| **CO3** | | 2 | | 3 | | |

| **Assessment** |
|---|
| The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6. |

| **Assessment Plan based on Bloom's Taxonomy Level** | | | | |
|---|---|---|---|---|
| **Bloom's Taxonomy Level** | **LA1** | **LA2** | **Lab ESE** | **Total** |
| Remember | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Understand | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Apply | 10 | 10 | 10 | **30** |
| Analyze | 10 | 10 | 10 | **30** |
| Evaluate | 5 | 5 | 10 | **20** |
| Create | 5 | 5 | 10 | **20** |
| **Total** | **30** | **30** | **40** | **100** |

**Walchand College of Engineering, Sangli**
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**AY 2021-22**

**Course Information**

| | |
|---|---|
| **Programme** | M. Tech (CS and IT) |
| **Class, Semester** | Second Year M. Tech., Sem III |
| **Course Code** | 5IT612 |
| **Course Name** | Professional Elective - 5: Visual Computing |
| **Desired Requisites:** | |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 2 Hrs/week | **T1** | **T2** | **ESE** | **Total** |
| **Tutorial** | - | 20 | 20 | 60 | 100 |
| **Practical** | - | | | | |
| **Interaction** | - | **Credits: 2** | | | |

**Course Objectives**

| | |
|---|---|
| **1** | To elaborate need of developing graphics application in visual computing |
| **2** | To demonstrate the graphics primitives like: line, circle, polygon etc. |
| **3** | To transform the media data for application development |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

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

| | | |
|---|---|---|
| **CO1** | Draw Geometric primitives using OpenGL | Analyze |
| **CO2** | Implement basic transformations on objects using OpenGL | Apply |
| **CO3** | Apply clipping algorithm on lines using OpenGL | Apply |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Introduction to Image Processing &Modeling:** Level of image data representation, Traditional & hierarchical data structure Image Enhancement in spatial domain, 3-D Modeling, Basic 3-D Programming principles | 4 |
| II | **Animation Techniques:** Traditional Animation, Principles of Animation, Overview & low-level motion specification, Animating articulated structures, soft object animation, procedural animation | 5 |
| III | **The OpenGL:** OpenGL Architecture, OpenGL API, primitives and attributes, First program in OpenGL, Drawing lines and shapes in OpenGL | 4 |
| IV | **Geometric Objects & Transformations:** Scalars, points and Vectors, Three-dimensional primitives, coordinate systems, OpenGL transformation Translation, scaling, Rotation. Composition of Transformation | 5 |
| V | **Lighting and surfacing:** Light and matter, the phong lighting model; computation of vectors; polygon shading; Approximation of sphere by recursive subdivision; Light sources in OpenGL; Specification of material in OpenGL | 4 |
| VI | **Rendering:** Display Lists, Texture mapping, Photon mapping, Radiosity, Ray Tracing, global illumination, shading of surfaces | 4 |

**Text Books**

| | |
|---|---|
| 1 | Edward Angel, "*Interactive Computer Graphics: A Top-Down Approach with OpenGL"*, 4th Edition Addison-Wesley, 2005 |
| 2 | Gonzalez & Woods, *"Digital Image Processing",* Thomson Press, 4th Edition, 2015 |

**References**

| | |
|---|---|
| 1 | F. S. Hill Jr. and S. M. Kelley , *"Computer Graphics using OpenGL (3/e)",* Pearson, 2007 |
| 2 | ShalliniGovil-Pai, *"Principles of computer Graphics"* , Springer, first edition, 2005 |
| 3 | Rechard Wright & Sweet, *"OpenGLSuperBible",* QUE, 2nd Edition, 2000 |

| Useful Links | |
|---|---|
| 1 | https://www.coursera.org/learn/computer-vision-basics#syllabus |
| 2 | https://www.classcentral.com/course/udacity-introduction-to-computer-vision-1022 |
| 3 | https://www.classcentral.com/course/introduction-computer-vision-watson-open-13849 |

| CO-PO Mapping | | | | | | |
|---|---|---|---|---|---|---|
| | Programme Outcomes (PO) | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| **CO1** | 2 | | 2 | | | 1 |
| **CO2** | | 2 | | 3 | | |
| **CO3** | 1 | | 1 | | | |

| Assessment |
|---|
| The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6. |

| Assessment Plan based on Bloom's Taxonomy Level | | | | |
|---|---|---|---|---|
| **Bloom's Taxonomy Level** | **T1** | **T2** | **ESE** | **Total** |
| Remember | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Understand | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Apply | 10 | 10 | 20 | **40** |
| Analyze | 5 | 5 | 15 | **25** |
| Evaluate | 5 | 5 | 15 | **25** |
| Create | | | 10 | **10** |
| **Total** | **20** | **20** | **60** | **100** |

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2021-22**

## Course Information

| | |
|---|---|
| **Programme** | M. Tech. (CS and IT) |
| **Class, Semester** | Second Year M. Tech., Sem III |
| **Course Code** | 5IT651 |
| **Course Name** | Activity Based Lab for Parallel Algorithm |
| **Desired Requisites:** | Advanced Algorithm |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | - | **LA1** | **LA2** | **Lab ESE** | **Total** |
| **Tutorial** | - | 30 | 30 | 40 | 100 |
| **Practical** | 2 Hrs/Week | | | | |
| **Interaction** | - | **Credits: 1** | | | |

## Course Objectives

| | |
|---|---|
| **1** | To experiment the parallel architecture in Parallel Algorithms |
| **2** | To use the process of parallelization in computer algorithms |
| **3** | To compare the thread and process parallel architecture |

## Course Outcomes (CO) with Bloom's Taxonomy Level

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

| | | |
|---|---|---|
| **CO1** | Implement the sequential and parallel algorithms | Apply |
| **CO2** | Compare the speedup factor of sequential and parallel algorithms | Analyze |
| **CO3** | Design the parallel algorithm to improve the performance parameters | Create |

## List of Experiments / Lab Activities

**List of Experiments:**

Activities are to be carried out individually.

Each student will perform the activity based on course on following areas.

1. Program on OpenMPI : string handling
2. Program on OpenMPI : matrix operations
3. Program on OpenMPI : control statements
4. Program on CUDA : dynamic parallelism
5. Program on CUDA: Memory management
6. Program on CUDA: OOP concepts
7. Program on OpenCL on objects
8. Porgram on OpenCL : image processing
9. Porgram on OpenCL : process synchronization
10. Porgram on OpenCL: KNN algorithm
11. Program on parallel execution of threads
12. Program on multi core system

Student should perform the activities on the basis of the real-time applications in the subjects and submit the work with code, PPT, PDF, Text report document & reference material or on online GitHub.

Students should maintain activity log book containing weekly progress.

## Text Books


| | |
|---|---|
| 1 | Anath Grama, Ansul Gupta, George Karypis, Vipin Kumar, *"Introduction to parallel computing",* Second Edition, Pearson Education, 2003 |
| 2 | Jaegeun Han, Bharatkumar Sharma, *"Learn CUDA Programming",* First Edition, Packt publishing, 2019 |


## References


| | |
|---|---|
| 1 | Horrowitz, Sahni Rajasekaran, "*Computer Algorithms*", Computer Science, W. H. Freeman and company Press, New York |


## Useful Links

| | |
|---|---|
| 1 | https://nptel.ac.in/courses/106/102/106102114/ |
| 2 | https://nptel.ac.in/courses/106/102/106102163/ |

| CO-PO Mapping | | | | | | |
|---|---|---|---|---|---|---|
| **Programme Outcomes (PO)** | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| **CO1** | 2 | | | 1 | 1 | |
| **CO2** | | | 1 | | | |
| **CO3** | | 3 | | 2 | | |

**Assessment**

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

| Assessment | Based on | Conducted by | Typical Schedule (for 26-week Sem) | Marks |
|---|---|---|---|---|
| LA1 | Lab activities, attendance, journal | Lab Course Faculty | During Week 1 to Week 6<br>Marks Submission at the end of Week 6 | 30 |
| LA2 | Lab activities, attendance, journal | Lab Course Faculty | During Week 7 to Week 12<br>Marks Submission at the end of Week 12 | 30 |
| Lab ESE | Lab activities, attendance, journal | Lab Course Faculty | During Week 15 to Week 18<br>Marks Submission at the end of Week 18 | 40 |

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

| Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses) | | | | |
|---|---|---|---|---|
| **Bloom's Taxonomy Level** | **LA1** | **LA2** | **Lab ESE** | **Total** |
| Remember | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Understand | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Apply | 10 | 10 | 10 | **30** |
| Analyze | 10 | 10 | 10 | **30** |
| Evaluate | 5 | 5 | 10 | **20** |
| Create | 5 | 5 | 10 | **20** |
| **Total Marks** | **30** | **30** | **40** | **100** |

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2021-22**

## Course Information

| | |
|---|---|
| **Programme** | M. Tech (CS and IT) |
| **Class, Semester** | Second Year M. Tech., Sem III |
| **Course Code** | 5IT652 |
| **Course Name** | Activity Based Lab for Software Reliability & Testing |
| **Desired Requisites:** | Software Engineering |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | - | **LA1** | **LA2** | **Lab ESE** | **Total** |
| **Tutorial** | - | 30 | 30 | 40 | 100 |
| **Practical** | 2 Hrs/Week | | | | |
| **Interaction** | - | **Credits: 1** | | | |

## Course Objectives

| | |
|---|---|
| **1** | To elaborate Software Reliability and Testing. |
| **2** | To demonstrate project management cycle for software development. |
| **3** | To use Agile development techniques for software development. |

## Course Outcomes (CO) with Bloom's Taxonomy Level

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

| | | |
|---|---|---|
| **CO1** | Apply concepts of Software Reliability and Testing | Apply |
| **CO2** | Analyze Software Reliability Growth Models in Software Development | Analyze |
| **CO3** | Test the Software system to detect fault tolerance | Evaluate |

## List of Experiments / Lab Activities

Activities are to be carried out individually.
Each student will perform the activity based on course on following areas.

1. Software Development Life Cycle
2. Software Design
3. Software Architecture and System Design
4. Software Testing with Testing Tools
5. Implement Black Box Testing(Manual)
6. Implement Unit Testing(Automated)
7. Implement Performance Testing

Student should perform the activities on the basis of the real-time applications in the subjects and submit the work with code, PPT, PDF, Text report document & reference material or on online GitHub.
Students should maintain activity log book containing weekly progress.

## Text Books

| | |
|---|---|
| 1 | Jalote Pankaj, *"An Integrated Approach to Software Engineering",* Narosa Publication, 3rd Edition, 2010. |
| 2 | Sommerville, *"Software Engineering"*, Pearson Education India, New Delhi,2nd Edition, 2006 |

## References

| | |
|---|---|
| 1 | Musa John D., *"Software Reliability Engineering"*, Tata McGraw Hill, 2nd Edition, 1999 |
| 2 | Lyu, *"Software Reliability Engineering"*, IEEE Computer Society Press, 1st Edition, 1996 |

## Useful Links

| | |
|---|---|
| 1 | Module I, II, III, IV, V - https://onlinecourses.nptel.ac.in/noc21_cs15/preview |

## CO-PO Mapping

**Programme Outcomes (PO)**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---|---|---|---|---|---|---|
| **CO1** | 1 | | 3 | | | 1 |
| **CO2** | | 2 | | 1 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **CO3** | 1 | | 1 | | | |

| **Assessment** | | | | |
|---|---|---|---|---|
| There are three components of lab assessment, LA1, LA2 and Lab ESE.<br>IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation. | | | | |
| **Assessment** | **Based on** | **Conducted by** | **Typical Schedule (for 26-week Sem)** | **Marks** |
| LA1 | Lab activities, attendance, journal | Lab Course Faculty | During Week 1 to Week 6<br>Marks Submission at the end of Week 6 | 30 |
| LA2 | Lab activities, attendance, journal | Lab Course Faculty | During Week 7 to Week 12<br>Marks Submission at the end of Week 12 | 30 |
| Lab ESE | Lab activities, attendance, journal | Lab Course Faculty | During Week 15 to Week 18<br>Marks Submission at the end of Week 18 | 40 |
| Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments. | | | | |

| **Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)** | | | | |
|---|---|---|---|---|
| **Bloom's Taxonomy Level** | **LA1** | **LA2** | **Lab ESE** | **Total** |
| Remember | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Understand | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Apply | 10 | 10 | 10 | **30** |
| Analyze | 10 | 10 | 10 | **30** |
| Evaluate | 5 | 5 | 10 | **20** |
| Create | 5 | 5 | 10 | **20** |
| **Total Marks** | **30** | **30** | **40** | **100** |

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2021-22**

## Course Information

| | |
|---|---|
| **Programme** | M. Tech (CS and IT) |
| **Class, Semester** | Second Year M. Tech., Sem III |
| **Course Code** | 5IT653 |
| **Course Name** | Activity Based Lab for Basics of Visual Computing |
| **Desired Requisites:** | Computer Graphics |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | - | **LA1** | **LA2** | **Lab ESE** | **Total** |
| **Tutorial** | - | 30 | 30 | 40 | 100 |
| **Practical** | 2 Hrs/Week | | | | |
| **Interaction** | - | **Credits: 1** | | | |

## Course Objectives

| | |
|---|---|
| **1** | To elaborate need of developing graphics application in visual computing |
| **2** | To demonstrate the graphics primitives like: line, circle, polygon etc. |
| **3** | To transform the media data for application development |

## Course Outcomes (CO) with Bloom's Taxonomy Level

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

| | | |
|---|---|---|
| **CO1** | Draw Geometric primitives using OpenGL | Analyze |
| **CO2** | Implement basic transformations on objects using OpenGL | Apply |
| **CO3** | Apply clipping algorithm on lines using OpenGL | Apply |

## List of Experiments / Lab Activities

**List of Experiments:**

Activities are to be carried out individually.

Each student will perform the activity based on course on following areas.

1. Program on to draw a cube cantered at (5.0, 5.0, 5.0) and display it using perspective projection.
2. Program to construct a robot arm and sow its movement.
3. Program to draw three tilted cube and spin it using OpenGL timer functions.
4. Program to create an environment of sky showing stars and walk through sky using
5. Program to construct a simple table using primitive objects and use suitable material and
6. Program on Lighting to display it. Provide camera movement using keys.
7. Program on Distance and Connectivity
8. Program on Image Arithmetic
9. Program on Point Operations
10. Program on Neighborhood Operations
11. Program on Image Histogram
12. Program on Image Segmentation
13. Create a simple animation to demonstrate solar system.

Student should perform the activities on the basis of the real-time applications in the subjects and submit the work with code, PPT, PDF, Text report document & reference material or on online GitHub.

Students should maintain activity log book containing weekly progress.

## Text Books


| | |
|---|---|
| 1 | Edward Angel, "*Interactive Computer Graphics: A Top-Down Approach with OpenGL"*, 4th edition Addison-Wesley, 2005 |
| 2 | Gonzalez & Woods, *"Digital Image Processing",* Thomson Press, 4th Edition, 2015 |


## References


| | |
|---|---|
| 1 | F. S. Hill Jr. and S. M. Kelley , *"Computer Graphics using OpenGL (3/e)",* Pearson, 2007 |
| 2 | ShalliniGovil-Pai, *"Principles of computer Graphics"* , Springer, first edition, 2005 |
| 3 | Rechard Wright & Sweet, *"OpenGLSuperBible",* QUE, 2nd Edition, 2000 |

| Useful Links | |
|---|---|
| 1 | https://www.coursera.org/learn/computer-vision-basics#syllabus |
| 2 | https://www.classcentral.com/course/udacity-introduction-to-computer-vision-1022 |
| 3 | https://www.classcentral.com/course/introduction-computer-vision-watson-open-13849 |

| CO-PO Mapping | | | | | | |
|---|---|---|---|---|---|---|
| | Programme Outcomes (PO) | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| **CO1** | 1 | | 3 | | | |
| **CO2** | | 1 | | 2 | 1 | |
| **CO3** | 2 | | 1 | | | |

**Assessment**

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

| Assessment | Based on | Conducted by | Typical Schedule (for 26-week Sem) | Marks |
|---|---|---|---|---|
| LA1 | Lab activities, attendance, journal | Lab Course Faculty | During Week 1 to Week 6<br>Marks Submission at the end of Week 6 | 30 |
| LA2 | Lab activities, attendance, journal | Lab Course Faculty | During Week 7 to Week 12<br>Marks Submission at the end of Week 12 | 30 |
| Lab ESE | Lab activities, attendance, journal | Lab Course Faculty | During Week 15 to Week 18<br>Marks Submission at the end of Week 18 | 40 |

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

| Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses) | | | | |
|---|---|---|---|---|
| **Bloom's Taxonomy Level** | **LA1** | **LA2** | **Lab ESE** | **Total** |
| Remember | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Understand | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Apply | 10 | 10 | 10 | **30** |
| Analyze | 10 | 10 | 10 | **30** |
| Evaluate | 5 | 5 | 10 | **20** |
| Create | 5 | 5 | 10 | **20** |
| **Total Marks** | **30** | **30** | **40** | **100** |

**Walchand College of Engineering, Sangli**
*(Government Aided Autonomous Institute)*

**AY 2021-22**

**Course Information**

| | |
|---|---|
| **Programme** | M. Tech. (CS and IT) |
| **Class, Semester** | Second Year M. Tech., Sem IV |
| **Course Code** | 5IT691 |
| **Course Name** | Dissertation Phase II |
| **Desired Requisites:** | Dissertation Phase I |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | - | **LA1** | **LA2** | **Lab ESE** | **Total** |
| **Tutorial** | - | 30 | 30 | 40 | 100 |
| **Practical** | 24 Hrs/Week | | | | |
| **Interaction** | - | **Credits: 12** | | | |

**Course Objectives**

| | |
|---|---|
| **1** | To instruct the issues of research design, methodology and ethics |
| **2** | To elaborate the process research with reference to existing systems |
| **3** | To test the objectives of research with standard benchmark |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

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

| | | |
|---|---|---|
| **CO1** | Demonstrate proposed solution for a dissertation | Apply |
| **CO2** | Test and validate designed system towards fault tolerance | Evaluate |
| **CO3** | Produce research findings in terms of technical publications and IPRs | Create |

**List of Experiments / Lab Activities**

**List of Experiments:**

Following activities are to be carried out in dissertation:

1. Objective Achieved: Approximated 75 to 80 % of stated objective in synopsis, test cases to be use.
2. Design and Methodology: Standard design for implementation of dissertation, inline methodologies to achieve objectives
3. Analysis: Review of methodology, debugging the codes, identifications of standard benchmarks for test comparisons
4. Publications: at least 2 publications in standard/indexed publication.
5. Report writing: Proper citation of sources, organized section of chapters, standard and valid references, nearly absolute contents
6. The work should be completed in all aspects of design, implementation and testing Dissertation reports should be prepared and submitted in soft and hard form al ong with the code and other dependency documents. Preferable use online code repositories (GitHub/bitbucket)

Dissertation report (pre-defined template) should be prepared using Latex/Word and submitted along with soft copy on CD/DVD (with code, PPT, PDF, Text report document & reference material) or on an online repository.

**Text Books**

| | |
|---|---|
| 1 | Rajendra Kumbhar , "*How to Write Project Reports, Ph. D. Thesis and Research Articles*", Universal Prakashan, 2015 |
| 2 | Marilyn Deegan, "*Academic Book of the Future Project Report*", A Report to the AHRC & the British Library, 2017 |

**References**

| | |
|---|---|
| 1 | Research journals from IEEE, ACM, Elsevier, Springer, Science Direct etc |

**Useful Links**

| | |
|---|---|
| 1 | https://ieeexplore.ieee.org/Xplore/home.jsp |

| | |
|---|---|
| 2 | https://www.sciencedirect.com |
| 3 | https://www.researchgate.net |
| 4 | https://www.geeksforgeeks.org/computer-science-projects/ |

| **CO-PO Mapping** | | | | | | |
|---|---|---|---|---|---|---|
| **Programme Outcomes (PO)** | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| **CO1** | 2 | 3 | | 2 | | 1 |
| **CO2** | | | 1 | | | |
| **CO3** | 1 | | | 1 | | |

**Assessment**

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

| Assessment | Based on | Conducted by | Typical Schedule (for 26-week Sem) | Marks |
|---|---|---|---|---|
| LA1 | Lab activities, attendance, journal | Lab Course Faculty | During Week 1 to Week 6<br>Marks Submission at the end of Week 6 | 30 |
| LA2 | Lab activities, attendance, journal | Lab Course Faculty | During Week 7 to Week 12<br>Marks Submission at the end of Week 12 | 30 |
| Lab ESE | Lab activities, attendance, journal | Lab Course Faculty | During Week 15 to Week 18<br>Marks Submission at the end of Week 18 | 40 |

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

| **Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)** | | | | |
|---|---|---|---|---|
| **Bloom's Taxonomy Level** | **LA1** | **LA2** | **Lab ESE** | **Total** |
| Remember | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Understand | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Apply | 10 | 10 | 10 | **30** |
| Analyze | 10 | 10 | 10 | **30** |
| Evaluate | 5 | 5 | 10 | **20** |
| Create | 5 | 5 | 10 | **20** |
| **Total Marks** | **30** | **30** | **40** | **100** |

**Walchand College of Engineering, Sangli**
*(Government Aided Autonomous Institute)*

**AY 2021-22**

**Course Information**

| | |
|---|---|
| **Programme** | M. Tech. (CS and IT) |
| **Class, Semester** | Second Year M. Tech., Sem IV |
| **Course Code** | 5IT671 |
| **Course Name** | Techno-Socio Activity |
| **Desired Requisites:** | -- |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | - | **LA1** | **LA2** | **Lab ESE** | **Total** |
| **Tutorial** | - | 30 | 30 | 40 | 100 |
| **Practical** | - | | | | |
| **Interaction** | 1 Hr/week | **Credits: 1** | | | |

**Course Objectives**

| | |
|---|---|
| **1** | To propose a structured and rational solution to address the relevant skills |
| **2** | To motivate students towards the desirous need of industry, economy and society |
| **3** | To applaud the opportunities to integrate IT based solutions with various enterprises |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

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

| | | |
|---|---|---|
| **CO1** | Employ the programme for welfare of society and environment | Apply |
| **CO2** | Appraise pragmatic skills for national and international competitions | Analyze |
| **CO3** | Recommend and propose engineering solution for industry and community | Evaluate |

**List of Experiments / Lab Activities**

**Assessment is based on the rubric decided by department**

Student can undertake any techno-socio activity as listed below but not limited to:

1. Each student or group of students may work for the welfare of the environment, society through programmes such as tree plantation, blood donation campaigns etc.
2. Each student or group of students participating in technical events/competition/exhibition.
3. Certification of the MOOC courses (beyond syllabus) / Programming competition/ interaction with industry
4. Developing any innovative gadget / solution / system and technology transfer in the interest of Nation / Society / Institute (WCE)
5. Publishing papers /articles in national / international conferences / journals or similar contributions
6. Coordinating students' clubs / services like SAIT/WLUG/Lab administration or any other
7. Organizing techno-socio activity for the students / community in rural areas, unprivileged areas

**Text Books**

| | |
|---|---|
| 1 | |

**References**

| | |
|---|---|
| 1 | |

**Useful Links**

| | |
|---|---|
| 1 | |

**CO-PO Mapping**

**Programme Outcomes (PO)**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---|---|---|---|---|---|---|
| **CO1** | 2 | | 3 | | | |
| **CO2** | | 1 | | 1 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **CO3** | 3 | | | | | |

| **Assessment** | | | | |
|---|---|---|---|---|
| There are three components of lab assessment, LA1, LA2 and Lab ESE.<br>IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation. | | | | |
| **Assessment** | **Based on** | **Conducted by** | **Typical Schedule (for 26-week Sem)** | **Marks** |
| LA1 | Lab activities, attendance, journal | Lab Course Faculty | During Week 1 to Week 6<br>Marks Submission at the end of Week 6 | 30 |
| LA2 | Lab activities, attendance, journal | Lab Course Faculty | During Week 7 to Week 12<br>Marks Submission at the end of Week 12 | 30 |
| Lab ESE | Lab activities, attendance, journal | Lab Course Faculty | During Week 15 to Week 18<br>Marks Submission at the end of Week 18 | 40 |
| Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments. | | | | |

| **Assessment Plan based on Bloom's Taxonomy Level** | | | | |
|---|---|---|---|---|
| **Bloom's Taxonomy Level** | **LA1** | **LA2** | **Lab ESE** | **Total** |
| Remember | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Understand | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Apply | 10 | 10 | 10 | **30** |
| Analyze | 10 | 10 | 10 | **30** |
| Evaluate | 5 | 5 | 10 | **20** |
| Create | 5 | 5 | 10 | **20** |
| **Total** | **30** | **30** | **40** | **100** |

**Walchand College of Engineering, Sangli**
*(Government Aided Autonomous Institute)*

**AY 2021-22**

**Course Information**

| | |
|---|---|
| **Programme** | M. Tech. (CS and IT) |
| **Class, Semester** | Second Year M. Tech., Sem IV |
| **Course Code** | 5IT621 |
| **Course Name** | Professional Elective - 6: Modern Data Centre |
| **Desired Requisites:** | Computer Networks |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 3 Hrs/week | **T1** | **T2** | **ESE** | **Total** |
| **Tutorial** | - | 20 | 20 | 60 | 100 |
| **Practical** | - | | | | |
| **Interaction** | - | **Credits: 3** | | | |

**Course Objectives**

| | |
|---|---|
| **1** | To elaborate fundamental knowledge of software defined network |
| **2** | To impart Software Defined Network operation in data centre |
| **3** | To compare various case studies of software defined network |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

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

| | | |
|---|---|---|
| **CO1** | Study the abstraction of control plane in software defined network | Analyze |
| **CO2** | Analyze the implications of traditional network architectures to software defined network | Analyze |
| **CO3** | Develop a network function for data centre applications | Create |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Introduction to SDN:** Basic Packet Switching Terminology, The Modern Data Center, Architecture of SDN, SDN Switch, Central Control, Active Networks, The Road to SDN | 6 |
| II | **Control and Data Plane:** Control/Data Separation, Opportunities in Various Domains, Challenges in Separating the Data and Control Planes, Routing Control Platform, The 4D Network Architecture | 7 |
| III | **Open Flow Protocol and SDN** OpenFlow: Flow Table structure, Flowtable Actions, Flow messages, Legacy Mechanisms Evolve Toward SDN, SDN Applications, and Alternate SDN Methods. | 6 |
| IV | **SDN in Data Centre** Data Centre Definition, Data Centre Demands, Tunneling Technologies for the Data Centre, Path Technologies in the Data Centre, Ethernet Fabrics in the Data Centre, SDN Use Cases in the Data Centre, Open SDN versus Overlays in the Data Centre, Real-World Data Centre Implementations. | 7 |
| V | **Application of SDN** Virtualization, Applications of Virtual Networking, Network Virtualization with Mininet, Slicing Network Control, Virtualization in Multi-Tenant Datacenter | 7 |
| VI | **Network Function Virtualization** Network Functions Virtualization, Docker and Containerization, Networking in Docker | 6 |

**Text Books**

| | |
|---|---|
| 1 | Chuk Black, Timothy Culver *"Software Defined Networks:A Comprehensive Approach"*, 2nd Edition, Wiley publication, 2016. |
| 2 | Thomas Erl, Zaigham Mahmood and Ricardo Puttini, "*Cloud Computing: Concepts, Technology & Architecture"*, Pearson, 1st Edition, 2010 |

| References | |
|---|---|
| 1 | Thomas D. Nadeau, *"Software Defined Networks, An Authoritative Review of Network Programmability Technologies"*, Ken Gray Publisher, August 2013, ISBN: 978-1-4493-4230-2. |
| | |
| **Useful Links** | |
| 1 | Module I, II, III, V, VI - https://www.coursera.org/learn/sdn#about |
| 2 | https://aws.amazon.com/ |

| **CO-PO Mapping** | | | | | | |
|---|---|---|---|---|---|---|
| **Programme Outcomes (PO)** | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| **CO1** | 2 | | 3 | | | |
| **CO2** | | 2 | | 2 | | |
| **CO3** | 1 | | 1 | | | 1 |

| **Assessment** |
|---|
| The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6. |

| **Assessment Plan based on Bloom's Taxonomy Level** | | | | |
|---|---|---|---|---|
| **Bloom's Taxonomy Level** | **LA1** | **LA2** | **Lab ESE** | **Total** |
| Remember | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Understand | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Apply | 10 | 10 | 10 | **30** |
| Analyze | 10 | 10 | 10 | **30** |
| Evaluate | 5 | 5 | 10 | **20** |
| Create | 5 | 5 | 10 | **20** |
| **Total** | **30** | **30** | **40** | **100** |

**Walchand College of Engineering, Sangli**
*(Government Aided Autonomous Institute)*

**AY 2021-22**

**Course Information**

| | |
|---|---|
| **Programme** | M. Tech (CS and IT) |
| **Class, Semester** | Second Year M. Tech., Sem III |
| **Course Code** | 5IT621 |
| **Course Name** | Professional Elective – 5: Advanced Internet Programming |
| **Desired Requisites:** | C & CPP Programming |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 2 Hrs/week | **T1** | **T2** | **ESE** | **Total** |
| **Tutorial** | - | 20 | 20 | 60 | 100 |
| **Practical** | - | | | | |
| **Interaction** | - | **Credits: 2** | | | |

**Course Objectives**

| | |
|---|---|
| **1** | To compare paradigm of Ruby and Go Programming Language |
| **2** | To implement the Ruby for file handling and error handling |
| **3** | To demonstrate the features of Go language for process synchronization |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

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

| | | |
|---|---|---|
| **CO1** | Implement object oriented programming concepts using Ruby | Apply |
| **CO2** | Use File handling in Ruby and Go language | Apply |
| **CO3** | Propose the solution for synchronization problem using Go Language | Analyze |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Introduction to Ruby Programming**<br>Brief history of Ruby, Installing & running Ruby, Command Line Arguments, Numbers, Text & Strings, Arrays & Hashes, Symbols, Expressions (True, False, Nil) Classes, Modules & Objects: Objects, Classes, Variables | 5 |
| II | **Flow Control & Statements and Properties**<br>Conditionals, Loops, Error & Exception Handling, Threads & Fibers<br>Classes, Modules & Objects : Simple Ruby Classes, Object Instances, Attributes, Inheritance, Persistence Methods, Attributes & Variables: Setter & Getter methods, Method Visibility (Access Control), Instance Variables | 5 |
| III | **Meta- programming & File Handling:**<br>Meta-programming :Exceptions, Types, Modules & Classes, Blocks & Strings, Variables, Missing Methods & Constants, Custom Structures, Dynamically adding methods, Threads, I/O Objects, Reading file, writing file. | 4 |
| IV | **Introduction to Go Language**<br>Introduction, Program Structure: names, declaration, variables, assignments, types, files, scope, number, string variables, arrays, slice | 4 |
| V | **Data Types and operations:**<br>Basic data types, composite data types, functions, control statements, methods, interface, pointers, structs | 4 |
| VI | **Concurrency with Shared variables:**<br>Race condition, mutual exclusion, memory synchronization ,package implementation | 4 |

**Text Books**

| | |
|---|---|
| 1 | Davd Flanagan, Yukihiro Mataumoto, "*The Ruby Programming Language: Everything You Need to Know*", O'Reilly; 1st edition (12 February 2008) |
| 2 | Alan A. A. Donovan, Brian W. Kernighan, "*The Go Programming Language*", Pearson Education; First edition (1 February 2016) |

**References**

| | |
|---|---|
| 1 | Yukihiro Matsumoto, David Flanagan , "*The Ruby Programming Language*", Shroff,1st Edition, 2008. |
| 2 | Caleb Doxsey, "*An Introduction to Programming in Go"*, CreateSpace Independent Publishing Platform (3 September 2012) |
| | |

| **Useful Links** | |
|---|---|
| 1 | https://onlinecourses.swayam2.ac.in/aic20_sp37/preview |
| 2 | https://www.javatpoint.com/ruby-tutorial |
| 3 | https://www.ruby-lang.org/en/documentation/quickstart/ |
| 4 | https://gobyexample.com/ |
| 5 | https://www.javatpoint.com/go-tutorial |
| 6 | https://www.coursera.org/specializations/google-golang |

| **CO-PO Mapping** | | | | | | |
|---|---|---|---|---|---|---|
| **Programme Outcomes (PO)** | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| **CO1** | 3 | | 2 | | 2 | |
| **CO2** | | 1 | | 1 | | |
| **CO3** | 2 | | 2 | | | |

| **Assessment** |
|---|
| The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6. |

| **Assessment Plan based on Bloom's Taxonomy Level** | | | | |
|---|---|---|---|---|
| **Bloom's Taxonomy Level** | **T1** | **T2** | **ESE** | **Total** |
| Remember | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Understand | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Apply | 10 | 10 | 20 | **40** |
| Analyze | 5 | 5 | 15 | **25** |
| Evaluate | 5 | 5 | 15 | **25** |
| Create | | | 10 | **10** |
| **Total** | **20** | **20** | **60** | **100** |

**Walchand College of Engineering, Sangli**
*(Government Aided Autonomous Institute)*

**AY 2021-22**

**Course Information**

| | |
|---|---|
| **Programme** | M.Tech. (CS and IT) |
| **Class, Semester** | Second Year M. Tech., Sem IV |
| **Course Code** | 5IT621 |
| **Course Name** | Professional Elective - 6: Social Media Analytics |
| **Desired Requisites:** | Data Structures |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 3 Hrs/week | **T1** | **T2** | **ESE** | **Total** |
| **Tutorial** | - | 20 | 20 | 60 | 100 |
| **Practical** | - | | | | |
| **Interaction** | - | **Credits: 3** | | | |

**Course Objectives**

| | |
|---|---|
| **1** | To analyze the concept of semantic web and related applications |
| **2** | To compare human behaviour in social web and related communities |
| **3** | To illustrate the visualization of social networks. |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

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

| | | |
|---|---|---|
| **CO1** | Analyse human behaviour in social web and related communities | Analyse |
| **CO2** | Evaluate relationships between social networks | Evaluate |
| **CO3** | Examine semantic web related applications | Evaluate |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Introduction**<br>Introduction to Semantic Web: Limitations of current Web Development of Semantic Web, Emergence of the Social Web, Social Network analysis: Development of Social Network Analysis, Key concepts and measures in network analysis. | 5 |
| II | **Web Data Semantics and Knowledge Representation**<br>Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities, Web-based networks, Applications of Social Network Analysis. Ontology and their role in the Semantic Web: Ontology-based knowledge Representation, Ontology languages for the Semantic Web: Resource Description Framework, Web Ontology Language | 7 |
| III | **Modeling And Aggregating**<br>State-of-the-art in network data representation, Ontological representation of social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data. | 6 |
| IV | **Issues Extraction and Mining Communities**<br>Extracting evolution of Web Community from a Series of Web Archive. Detecting communities in social networks. Definition of community. Evaluating communities. Methods for community detection and mining. | 6 |
| V | **Predicting Human Behavior and Privacy Issues**<br>Understanding and predicting human behaviour for social communities, User data management, Inference and Distribution, Enabling new human experiences, Reality mining, Context, Awareness, Privacy in online social networks, Trust in online environment. | 7 |
| VI | **Visualization And Applications of Social Networks**<br>Graph theory, Centrality, Clustering, Node-Edge Diagrams, Matrix representation, visualizing online social networks, Visualizing social networks with matrix-based representations, Matrix and Node-Link Diagrams | 7 |

**Text Books**

| | |
|---|---|
| 1 | Peter Mika, "*Social Networks and the Semantic Web*", 1st Edition, Springer 2007. |
| 2 | Borko Furht, "*Handbook of Social Network Technologies and Applications*", 1st Edition, Springer, 2010.j |
| | |
| **References** | |
| 1 | Guandong Xu ,Yanchun Zhang and Lin Li, "*Web Mining and Social Networking – Techniques and applications*", First Edition Springer, 2011. |
| 2 | Charu C. Aggarwal, "*Social Network Data Analytics*", Springer; 2011 |
| | |
| **Useful Links** | |
| 1 | https://nptel.ac.in/courses/106/106/106106169/ |
| 2 | https://blog.hootsuite.com/social-media-analytics/ |
| 3 | https://towardsdatascience.com/how-to-get-started-with-social-network-analysis-6d527685d374 |

| **CO-PO Mapping** | | | | | | |
|---|---|---|---|---|---|---|
| **Programme Outcomes (PO)** | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| **CO1** | 2 | | 2 | | | |
| **CO2** | | 3 | | 3 | | |
| **CO3** | 1 | | 1 | | 2 | |

| **Assessment** |
|---|
| The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6. |

| **Assessment Plan based on Bloom's Taxonomy Level** | | | | |
|---|---|---|---|---|
| **Bloom's Taxonomy Level** | **LA1** | **LA2** | **Lab ESE** | **Total** |
| Remember | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Understand | To be used minimum | To be used minimum | To be used minimum | To be used minimum |
| Apply | 10 | 10 | 10 | **30** |
| Analyze | 10 | 10 | 10 | **30** |
| Evaluate | 5 | 5 | 10 | **20** |
| Create | 5 | 5 | 10 | **20** |
| **Total** | **30** | **30** | **40** | **100** |