

COVER PAGE

FOUNDATIONS OF IoT (18CS110)

III Year B.Tech: II Sem

L: 3 T: 0 P: 0 C: 3

Name of the Instructor(s)

Name of the instructor	Office location	Office Phone	Email	Office hours
B Vijay Kumar	Center for IoT, SRiX	9849121658	vijay_kumar_b@srecwarangal.a c.in	Wed: 3-5Pm Sat: 2-4 Pm

No. of Hours/week: 3hrs

Total number of hours planned: 48

Course Code: 18CS110	Course Title: FOUNDATIONS OF IoT	
L-T-P: 3-0-0	Credits: 3	Contact Hrs: 48
Term Work Marks: 30	Theory Marks: 70	Total Marks: 100
Teaching Hrs: 48		Exam Duration: 3 hrs

Pre-requisite

- Basic knowledge about IoT Devices and Sensors.
- Programming skill in C / Java to learn python.
- Hardware programming language called processing, which is similar to the C language for Arduino Integrated Development Environment (IDE) / Raspberry Pi.
- Basic Knowledge on cloud.

Learning Resources

1. Chalk and Talk
2. Activities
3. PPTs
4. Videos
5. Textbooks
6. Software
7. Relevant reading materials

Required Resources:

Text Books (List of books as mentioned in the approved syllabus)

1. Foundational Elements of an IoT Solutions: The Edge, The Cloud

2. Application Development, Joe Biron and Jonathan Follett
3. Arshdeep Bahga and Vijay Madiseti, "Internet of Things – A Hands on Approach", Universities Press, 2015.
4. Matt Richardson and Shawn Wallace, "Getting Started with Raspberry Pi", O'Reilly(SPD)/Prentice Hall.005

References Text Books:

1. Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, by Francis daCosta, ISBN: 978-1-4302-5740-0, 2013
2. Architecting the Internet of Things, by Dieter Uckelmann, Mark Harrison and Florian Michahelles, ISBN: 978-3-642-19157-2, 2011
3. McKinsey&Company, "The Internet of Things: Mapping the value beyond the hype", McKinsey Global Institute, 2015
4. Yatish Patil, Azure IoT Development Cookbook: Develop and manage robust IoT solutions. Packt Publishing - ebooks Account (August 11, 2017).
5. Hiroto Yasuura, Chong-Min Kyung, Yongpan Liu, Youn-Long Lin, Springer; 1st ed. 2018 edition (29 May 2017).
6. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", New York, Apress, 2014.
7. Marco Schwartz, "Internet of Things with the Arduino Yun", Packt Publishing, 2014.

Reading materials:

1. Lecture notes soft copy will be provided to the students.
2. Online video links will be provided.

Additional Resources:

1. <https://internetofthingsagenda.techtarget.com/definition/IoT-device>
2. <https://iot.do/devices>
3. <https://www.arduino.cc/en/Main/Software>
4. <http://www.circuitbasics.com/how-to-write-and-run-a-python-program-on-the-raspberry-pi/>
5. <https://www.raspberrypi.org/>
6. <https://www.jeremymorgan.com/tutorials/raspberry-pi/raspberry-pi-programming-python/>
7. <https://azure.microsoft.com/en-us/overview/what-is-cloud-computing/>

How to Contact Instructor:

- In-person office hours: time and location
 1. Students able to meet, whenever we are free schedule during the college hours.
 2. Students can meet (Wed: 3-5Pm and Sat: 2-4 Pm)
- Online office hours: time and how to access
 - Email address: vijay_kumar_b@srecwarangal.ac.in
 - Phone numbers: 9849121658
- Google Class room

Technology Requirements: (optional)

- Laptops for class work: To implement various real time IoT applications
- Software: Arduino IDE and Raspberry PI
- Learning management system: Online Coursera or NPTEL

Overview of Course:

- What is the course about its purpose?
Internet of Things plays a vital role in the field of computer Science and Engineering. Now days each and every devices are connected through internet so that purpose to study IoT. In future more number of devices to be connects.
Devices and objects with built in sensors are connected to an Internet of Things platform, which integrates data from the different devices and applies analytics to share the most valuable information with applications built to address specific needs.
These powerful IoT platforms can pinpoint exactly what information is useful and what can safely be ignored. This information can be used to detect patterns, make recommendations, and detect possible problems before they occur.
- What are the general topics or focus?
 - Introduction of IoT and its characteristics
 - Sensors, actuators and devices related IoT applications
 - Learn about various IoT application implemented
 - Arduino and Raspbarry PI software
 - Python and C code
 - Pinout and Architecture about Arduino and Raspbarry PI
- How does it fit with other courses in the department or on campus?
Internet of things is a multidisciplinary research area it is suitable for any subject such as Embedded Systems (ECE), Computer Networks (CSE), Control Systems(EEE).
- Why would students want to take this course and learn this material?
In future all electrical, electronic, sensors and IT devices are connecting through internet.

Methods of instruction

- Lecture
- Group Discussion
- Team work
- Field work

Workload

- Estimated amount of time to spend on course readings: **3 hours per week**
- Estimate amount of time to spend on course assignments and projects: **2-3 hours per week**

Assessment

S. No	Assessments	Assessment Methodology	No of assessments	Weightage in marks	Marks scaled to
	CIE	Quizzes	--	--	--
		Class test	--	--	--
		Assignment	2	10	5
		Course Activity	5	25	5
		Course Project	--	--	--
		Internal exams	2	20	20
	SEE	--	--	--	70

Final grade will computed as follows:

Course grade	Range
A	90% - 100%
B	80% - 89.9%
C	70%-79.9%
D	60%-69.9%
E	<60%

Assignments:

Two types of assignments are planned:

1. **Homework:**

Two Assignments are given to the students

1.20 **Assignment –I:**

Schedule : Before the I-Internal Examination

Syllabus : I-Unit, II-Unit and III-Unit.

Rubrics:

H.T.No	Assignment Submitted In Time (5M)
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H.T.No	Assignment Not Submitted In Time (0 M)
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1.21 **Assignment –II:**

Schedule : Before the II-Internal Examination

Syllabus : IV-Unit, V-Unit and VI-Unit.

Rubrics:

H.T.No	Assignment Submitted In Time (5M)
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H.T.No	Assignment Not Submitted In Time (0 M)
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Total Assignment Marks(5M) = (Assignment-I+Assignment-II)/2

2. Activity:

2.20 Activity I:

Identifying the Sensor Components and its operational features?

Students should able to identify the sensor and should able to tell the functionality of the sensor.

Rubrics:

H.T.No	Identify the component(2m)	Functionality of the Component (3m)	Total Marks (5m)
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2.21 Activity II:

Identify the Arduino Board pins and its Operations?

Students should able to identify the Arduino board pins and should able to develop the simple code i.e ... example Blinking LED.

Rubrics:

H.T.No	identify the Arduino board pins (2m)	simple code (2m)	Execution (1m)	Total Marks (5m)
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2.22 Activity III:

Identify the Raspberry Pi Board pins and its Operations?

Students should able to identify the Raspberry Pi pins and should able to develop the simple code i.e ... example Blinking Multiple LED's.

Rubrics:

H.T.No	identify the Raspberry Pi board pins (2m)	simple code (2m)	Execution (1m)	Total Marks (5m)
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2.23 Activity IV:

Awareness on the cloud?

Student should able to:

- Making the student to register (create Logins) in any one of the free Cloud
- i.e Things Speak, Things Board, Fire base, AWS, IBM Cloud.
- Connecting a sensor (i.e Humidity sensor, Temperature sensor, PIR Sensor... etc) to Arduino / Raspberry Pi Boards.
- Connecting to any one of the free cloud and able to send the values to the cloud and should retrieve the values from the cloud

Rubrics:

H.T.No	Establish a circuit (1m)	Sending sensor data to cloud (2m)	Retrieving Sensor data from cloud (2m)	Total Marks (5m)
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2.24 Activity V:

Sample Project – “IoT weather station”: Students will build a small IoT device that integrates with temperature sensor, light sensor and rain sensor. The device creates a website where a user is able to read temperature, light, and rain data. This project enables students to implement a small IoT system and learn how to write programs on embedded devices.

H.T.No	Check the design as per the concepts discussed in class room(1m)	Requirements(h/s) used as per the design (2m)	Implementation and Execution (2m)	Total Marks (5m)
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Total Activity Marks(5M)=(Activity-I + Activity-II+Activity-III+Activity-IV+Activity-V)/5

make up an IoT system														
(CO3) Differentiate between the levels of the IoT stack and the key technologies employed at each layer of the stack		3												
(CO4) Discuss the Design goals and Implementation Issue in IoT			3											
(CO5) Develop complete IoT system involving prototyping, programming and data analysis				3				3						3

Course Content (Syllabus)

Lecture No.	Topic	Delivery Method/ Activity
UNIT-I		
1	Introduction	Brainstorm
2	What is IoT?	Chalk and Talk
3	Overview, Importance, Definition	Chalk and Talk
4	Elements of IoT	Chalk and Talk
5	Technology	PPT
6	Business Drivers	Discussion
7	IoT Trends and Implications	Chalk and Talk
8	Activity-I Identifying the Sensor Components and its operational features?	HW

UNIT-II		
9	Solution Patterns for the IoT	Chalk and Talk
10	Product – Customer Relationship	Chalk and Talk
11	Elements of Smart Devices	Chalk and Talk/PPT
12	Elements of Smart Connected Devices	Chalk and Talk/PPT
13	Overview of Applications	Chalk and Talk/PPT
14	Activity-II Identify the Arduino Board pins and its Operations?	SW & HW
15	Activity-III Identify the Raspberry Pi Board pins and its Operations?	SW & HW
UNIT-III		
16	Connectivity and Networks	Chalk and Talk
17	The Edge of IoT	Chalk and Talk
18	Connecting, securing and interacting with things from the cloud	Chalk and Talk
19	Protocols	Brainstorm Chalk and Talk
20	Application Layer	Chalk and Talk
21	Application Layer - MQTT	PPT
22	Application Layer - CoAP	PPT
23	Application Layer- XMPP, AMQP	PPT
24	Application Layer - MAC 802.15.4	PPT
25	Wireless technologies	PPT
UNIT-IV		
26	The cloud	Chalk and Talk /PPT
27	Key technologies	Chalk and Talk
28	Design goals	Chalk and Talk
29	Implementation Issues	Chalk and Talk
UNIT-V		
30	IoT Applications	PPT/ SW & HW
31	Realizing IoT applications	SW & HW

32	Business case	PPT
	Activity-IV Connecting to any one of the free cloud and able to send the values to the cloud and should retrieve the values from the cloud.	SW & HW
UNIT-VI		
33	IoT Applications	Think-Pair-Share
34	Creating a new IoT application	SW & HW
35	Develop a IoT System from idea to market	Think-Pair-Share
36	Activity-V Sample Project - "IoT weather station": Students will build a small IoT device that integrates with temperature sensor, light sensor and rain sensor. The device creates a website where a user is able to read temperature, light, and rain data. This project enables students to implement a small IoT system and learn how to write programs on embedded devices.	Think-Pair-Share

DISTRIBUTED SYSTEMS (18CS109)

III B.Tech: II Sem

L: 3 T:0 P:0 C: 3

Name of the Instructor(s): Syed nawaz pasha

No. of Hours/week: 3

Total number of hours planned: 48

Pre-requisite

- Operating systems, Computer networks

Learning Resources

Course notes, PPTs, Web links

Required Resources

Name of the Textbook:

1. Andrew S.Tanenbaum: “Distributed Operating System”, Prentice Hall International Inc.1995,ISBN:0-13-031358-0
2. George Coulouris, Jean Dollimore and Tim Kindberg “Distributed Systems: Concepts and Design” edition – Wesley Pearson Education 2001,ISBN:-10:0273760599

Reading materials:

1. George Coulouris , Jean, Dollimore Tim Kindberg), Gordon Blair, “ Distributed Systems: Concepts and Design” (5th Edition) ,edition – Wesley 2011,ISBN:10:0132143011
2. Paolo Sivilotti,” Introduction to Distributed Systems”, 2005,ISBN:0321349601

Additional Resources:

1. <http://nptel.ac.in/courses/106108101/>
2. <http://williamstallings.com/DISTRIBUTED> OperatingSystems/OS7e-Student/
3. <http://williamstallings.com/OS/OS6e.html>

How to Contact Instructor:

- In-person office hours: 9:30 AM to 5:00 PM – Room no.: 1311
- Online office hours: 9:30 AM to 5:00 PM - Except class timings, a mail or message
 - Mail: syed_nawaz_pasha@srecwarangal.ac.in
 - Phone numbers: 9959054349

Other than office hours: A message to the above number from 6PM to 9PM from Monday to Saturday and 8AM to 10 AM on Sunday

Overview of Course:

- **What is the course about: its purpose?**

Being a Computer Science and Engineering student, one should learn a course on distributed Operating Systems to gain an understand and insight into how distributed operating systems work in real time environment. What are the challenges and design issues in distributed systems. The students must gain an understanding of the core concepts of distributed systems like synchronization, communication and mutual exclusion,

- **What are the general topics for focus?**
 1. Design issues of distributed systems
 2. synchronization of systems
 3. clock algorithms
 4. handling deadlocks
 5. File management
 6. Thread Management
 7. distributed shared memory
 8. page based distributed shared memory

- **How does it fit with other courses in the department or on campus?**

It is the first course that forms the basic to learn various advance courses like data mining and bigdata analytics that will follow up in the next semester for the students. Having knowledge of distributed systems make a platform for students to under the concepts that they are going to take up in the forth coming semesters.

- **Why would students want to take this course and learn this material?**
 1. It is very important for a Computer Science and Engineering student to know in detail about distributed system and its functionality.
 2. It is the basic subject if they want to choose their career path in data mining or data analytics.

Methods of instruction

- Lecture using PPTs in classroom
- Brainstorming and Discussion
- Group work as pair or sometimes as a group of 4 students
- Flipped classroom teaching
- Chalk and Talk while solving problems in some topics

Workload

- Estimated amount of time student needs to spend on course readings (per week): (2 hours)
- Estimate amount of time to student needs to spend on course assignments and projects (per week): (1 hour)

Assessment

S. No	Assessments	Assessment Methodology	No of assessments	Weightage in marks	Marks scaled to
	CIE	Quizzes	02	05	05
		Class test			
		Assignment	02	05	05
		Course Activity			
		Course Project			
		Internal exams	2	10	20
	SEE	--	--	--	70

Quiz: Schedule:

Test-Type	Syllabus	Tentative Date & Time	Mode
Quiz-1	1 st Unit and 2 nd Unit	8 th Week-Last Working Hour	Online
Quiz-2	3 rd Unit and 4 th Unit	14 th Week-Last Working Hour	Online

Assignments

Topic	Rubrics	Unit	Schedule
1 st Unit and 2 nd Unit	10 questions each one mark	I	4 th Week
3 rd Unit and 4 th Unit	10 questions each one mark	II	8 th Week

Absentees for class assessments:

- With HOD permission Re-conduction of the Class Assessment will be done within next two working days from 4:00 PM to 5:00PM, Class Test/Quiz mark is evaluated for 75% of original marks.
- Students who have taken prior permission from the HOD, re-conduction of the Class Assessment will be done within next two working days from 4:00 PM to 5:00PM Class Test/Quiz mark is evaluated for original marks.

LESSON PLAN

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Accomplish the fault and its tolerance.
2. Design the distributed file systems through shared variable, object based and bus based multi processors.
3. The design and usage of distributed file systems in the real world.
4. Recognize the feasibilities and the impossibilities in managing resources.
5. Identify the problems in developing distributed applications.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	3	2											3	2
CO2	2	3	3	2									2	3
CO3		2	3	2	3									2
CO4		2	2										2	
CO5	2	3	3	2	2									2

Syllabus

UNIT I

Introduction to Distributed Systems: Distributed systems: Goals Hardware Concepts Software - design Communication distributed systems: Layered Protocol: ATM Networks client server model - remote procedure call - group communication.

UNIT II

Synchronization: Clock synchronization - mutual exclusion - election atomic transactions – dead locks. Process and Processors: Threads - System models processor allocation - scheduling fault tolerance

UNIT III

Real time distributed systems, Distributed file systems: File system design and implementation - trends in distributed file systems.

UNIT IV

Shared Memory: Introduction – bus based multi processors ring based multiprocessors switched. Multiprocessors - NUMA comparison of shared memory systems - consistency models - page based distributed shared memory.

UNIT V

Shared variable distributed shared memory; object based distributed shared memory, Case studies: MACH and CHORUS

Lesson Plan:

Lecture No.	Topic	Delivery Method/ Activity
1	Introduction to Distributed Systems	PPT
2,3	Distributed systems: Goals Hardware Concepts	PPT
4	Software - design Communication	PPT
5	Layered Protocol:	PPT/CHALK AND TALK
6,7	ATM Networks client server model	PPT
8	remote procedure call	CHALK AND TALK
9	Group communication.	PPT
UNIT - II		
10,11	Synchronization: Clock synchronization	CHALK AND TALK
12,13	- mutual exclusion	CHALK AND TALK
14,15	Election	PPT
16,17	atomic transactions – dead locks	CHALK AND TALK
18	Process and Processors	CHALK AND TALK
19	Threads - System models	PPT
20,21	processor allocation - scheduling fault tolerance	PPT
Activity Quiz and Assignment		
UNIT - III		
22	Real time distributed systems	PPT
23	Distributed file systems	PPT
24,25	File system design	PPT
26,27	File system design Implementation	PPT/CHALK AND TALK
28	Trends in distributed file systems.	PPT
UNIT - IV		

29	Shared Memory: Introduction	PPT
30,31	bus based multi processors	PPT
32,33,34	ring based multiprocessors	PPT
35,36	Multiprocessors – NUMA	PPT
37	comparison of shared memory systems	PPT
38,39	consistency models	PPT
40,41	Page based distributed shared memory.	PPT
42,43	Shared variable distributed shared memory	PPT
	UNIT - V	
44	Distributed shared memory	PPT
45	Object based distributed shared memory	PPT
46,47	Case studies: MACH	CHALK AND TALK
48	CHORUS	CHALK AND TALK
Activity Quiz and Assignment		

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CYBER LAWS (OE115)

IV B.Tech: II Sem

L: 3 T: 0 P: 0 C: 3

Name of the Instructor(s):

1. Dr. D. Kothandaraman
2. J. Bhavana

No. of Hours/week: 3 hours per week

Total number of hours planned: 48

Pre-requisite

- Basic knowledge about internet crimes
- Cyber issues related to the internet, communication technology, and electronic elements including hardware, software, computer and information systems.
- Legal and illegal issues related to the internet crimes.

Learning Resources

1. Lecture Notes

Required Resources:

Textbook:

1. Harish Chander, "Cyber Laws and IT Protection", PHI, 2012.

References book:

1. George Kostopoulos, "Cyberspace and Cyber Security", Auerbach Publications, 2012.
2. Albert Marcella, Jr., Doug Menendez, "Cyber Forensics: A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes", Auerbach Publications, 2nd Edition, 2007.

Reading materials:

1. Lecture notes soft copy will be provided to the students.
2. Online video links will be provided.

Additional Resources:

- <https://www.itlaw.in/>
- <http://ili.ac.in/e-learnCL.htm>

How to Contact Instructor:

- In-person office hours:
 1. Students can able to meet, whenever we have free schedule during the college hours.
 2. Students can able to meet 3:00 pm to 4:00 pm in college working hours.
- Online office hours: time and how to access

- Email address: kothanda_raman_d@srecwarangal.ac.in and bhavana_j@srecwarangal.ac.in
- Phone numbers: 9944380724, 9866918803
- LMS: 7 pm to 10pm

Technology Requirements:

- Google classroom

Overview of Course:

- **What is the course about: its purpose?**
A cyber law plays a vital role in all electronic contents in internet. Cyber-law is created to help protect people and organizations on the internet from malicious people on the internet and help to maintain order. If someone breaks a cyber-law or rule, it allows another person or organization to take action against that person or have them sentenced to a punishment.
- **What are the general topics or focus?**
 1. Scope of cyber laws
 2. Online resources related to cyber laws
 3. Security information's
 4. Regulation of cyber crimes
 5. Types of E-commerce
 6. IPR Issues
- **How does it fit with other courses in the department or on campus?**
Cyber laws course common to all branches.
- **Why would students want to take this course and learn this material?**
In future all electronic contents are processing in internet. So that everyone should aware about the cyber-crime related to the personal and office data's.

Methods of instruction

- Lecture
- Group Discussion
- Team based learning

Workload

- Estimated amount of time student needs to spend on course readings: **1 hour per week**
- Estimate amount of time to student needs to spend on course assignments and projects: **1 hour per week**

Assessment

S. No	Assessments	Assessment Methodology	No of assessments	Weightage in marks	Marks scaled to
	CIE	Quizzes	--	--	--
		Class test	--	--	--
		Assignment	2	2.5	5
		Course Activity	2	2.5	5
		Course Project	--	--	--
		Internal exams	2	10	20
	SEE	--	--	--	70

Assessments:

Two types of assessments: 1. Assignments 2. Activities

1. Assignment:

1.1. Assignment:

Schedule: Before the I-Internal Examination

Syllabus: I-Unit, II-Unit and III-Unit.

1. 2. Assignment:

Schedule: Before the II-Internal Examination

Syllabus: IV-Unit, V-Unit.

Note: If the students submit the assignment in time then, will be given with 2.5 marks, otherwise 0 marks

2. Activities:

2. 1. Activity:

Topic: Analyze in details about different role of electronic signatures

Activity: Think Pair Share

Description of the Activity: Each team has to analyses the role of electronic signature.

Rubrics:

H.T.No	Identify the electronic signature(1m)	Identify different electronic evidence (1.5m)	Total Marks (2.5m)

2. 2. Activity:

Topic: Offences under the Cyberspace law and the Internet in India

Activity: Think Pair Share

Description of the Activity: Each team has to write important offences under the cyberspace laws in internet in india.

Rubrics:

H.T.No	Identify the important offences (1m)	What are the offences under cyber laws and the internet in india (1.5m)	Total Marks (2.5m)
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Note: If done the activity 2.5 marks, otherwise 0 marks

Key concepts

- Introduction to Computer Technology and Programming.
- Legal Dimensions of IPR in Cyber World.
- Fundamentals of Information Security.
- E-Business Security.
- Communication and Soft Skills.
- IT Acts and Cyber Crime.
- OS: Linux, Server (Apache)
- IT Act, Information assurance & e-Governance/ Data Information & Cryptography.

LESSON PLAN**Course Outcomes (COs):**

At the end of the course the student should be able to:

1. Analyze and evaluate the current trends and technologies such as e-commerce and e-governance.
2. Sketch the importance of digital signature in electronic records.
3. Formulate the importance and role of cyberspace laws and cyber-crimes.
4. Design and motivate law relating to electronic records and intellectual property rights in India.
5. Summarize about the IT act in India and generate the new IT acts for current cyber space.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	3	3								1		1	3	3
CO2	3	3	3	2									3	3
CO3	3	2	2	2					1				3	2
CO4	3	3	2	2									3	2
CO5	3	2	2	2					1				3	2

Course Content (Syllabus)

Content	Hrs
Unit - 1	
Internet, E-Commerce and E-Governance with reference to Free Market Economy: Understanding Computers, Internet and Cyber laws, Conceptual Framework of E-commerce: E-Governance, the role of Electronic Signatures in E-commerce with Reference to Free Market Economy in India.	10.00 hrs
Unit - 2	
Law Relating to Electronic Records and Intellectual Property Rights in India: Legal aspects of Electronic records / Digital signatures, The roles and regulations of Certifying Authorities in India, Protection of Intellectual Property Rights in Cyberspace in India	10.00 hrs
Unit - 3	
International Efforts Relating to Cyberspace Laws and Cyber Crimes: International efforts related to Cyber laws, Council of Europe (COE) convention on Cyber Crimes.	10.00 hrs
Unit - 4	
Penalties, Compensation and Offences Under the Cyberspace and Internet in India: Penalties, Compensation and Adjunction of violations of provisions of IT Act and Judicial review, some important offences under the Cyberspace law and the Internet in India, Other offences under the Information Technology Act in India.	10.00 hrs
Unit - 5	
Miscellaneous Provisions of IT Act and Conclusions: The role of Electronic Evidence and miscellaneous provisions of the IT Act.	08.00 hrs

Lecture No.	Topic	Delivery Method/ Activity
UNIT – I Internet, E-Commerce and E-Governance with reference to Free Market Economy:		
L1	Introduction	Chalk and Talk
L2	Chalk and Talk	Chalk and Talk
L3,L4	Internet and Cyber laws	Chalk and Talk
L5,L6	Conceptual Framework of E-commerce	PPTs
L7,L8	E-Governance	PPTs

L9	Role of Electronic Signatures (2.1 Activity)	Think Pair Share
L10	E-commerce with Reference to Free Indian Market	PPTs
UNIT – II Law Relating to Electronic Records and Intellectual Property Rights in India		
L11	Introduction	PPTs
L12	Legal aspects of Electronic records	PPTs
L13	Digital signatures	Think Pair Share
L14	The roles and regulations of Certifying Authorities in India	PPTs
L15,L16	Protection of Intellectual Property Rights in Cyberspace in India	PPTs
	(1. 1. Assignment)	
UNIT – III International Efforts Relating to Cyberspace Laws and Cyber Crimes:		
L17	Introduction	Chalk and Talk
L18,L19	International efforts related to Cyber laws	PPTs
L20	Council of Europe (COE) convention on Cyber Crimes	PPTs
UNIT – IV Penalties, Compensation and Offences Under the Cyberspace and Internet		
L21	Penalties	Chalk and Talk
	(1.2. Assignment)	
L22,L23	Compensation and Adjunction of violations of provisions of IT Act and Judicial Review	PPTs
L24,L25	Some important offences under the Cyberspace law and the Internet in India (2.2. Activity)	Think Pair Share
L25,L26	Offences under the Information Technology Act in India	PPTs
UNIT-V - Miscellaneous Provisions of IT Act and Conclusions		
L26,L27,L28	The role of Electronic Evidence	Team-based learning
L29,L30	Miscellaneous provisions of the IT Act	PPTs

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SOFTWARE ENGINEERING (CS114)

III B.Tech: II Sem

L:4 T: P: C:4

Name of the Instructor(s): **A. Harshavardhan**
D .Kodandaraman
D. Ramesh

No. of Hours/week: **4**

Total number of hours planned: **60**

Pre-requisite

- Computer Programming,
- Object Oriented Programming Concepts

Learning Resources

Handouts, Google Classroom

Required Resources

- Software Engineering: Theory and Practice, Fourth Edition By Shari Lawrence Pfleeger, Joanne M. Atlee
- Roger S Pressman, “Software Engineering: A Practitioner's Approach”, Sixth Edition, TMH
- Ian Sommerville, “Software Engineering” Seventh Edition, TMH
- Hans van Vliet, “Software Engineering: Principles and Practice” ,Third Edition TMH

Reading Material:

- Lecture Notes

Additional Resources :

- Nptel Videos
- IIT Karaghpur SE Virtual Lab

How to Contact Instructor:

- In-person and office hours: 3 p.m to 5.00 p.m on Wednesday and Thursday, In cabin
 - Email address:harshavgse@gmail.com, ramesh_d@srecwarangal.ac.in, kothanda_raman_d@srecwarangal.ac.in
 - Phone numbers: 9247282623,9848142720,9944380724
 - LMS:Kahoot and Google classroom
 - Mails and LMS will be check every day at 8.00 P.M

Technology Requirements:

- Learning management system (Google classroom / Kahoot)
- Star UML / Umbrella / Rational Rose

Overview of Course:

- **What is the course about: its purpose?**
 - Software Engineering is a part of computer science in which several kind of method, thoughts and techniques used for getting the high quality software and computer programs.
 - Minimum cost
 - On given time
 - Continuous production
 - We can judge the usefulness of the software Engineering with the importance of its attributes. Both are used for the same manner. The basic target of software Engineering is to provide the high quality software, which can be delivered.
 - On given time,
 - Within budget &
 - That fulfills the need.
 - Thus we can say that this is the best way or programs to get the following points:
 - To provide the best output of software system.
 - To make easy to use the software systems and develop them.
 - To improve the rate of production.
 - To maintain the budget for development of Software system.
 - Job satisfaction of software engineering.
- **What are the general topics or focus?**
 - Processing Models, Life Cycle, Architecture, Testing, Maintenance, Evaluation, Documentation
- **How does it fit with other courses in the department or on campus?**
 - Able to choose right processing model and design the model at the time of Mini project and External Projects.
 - EPICS Course
- **Why would students want to take this course and learn this material?**
 - It will be helpful to manage and develop the effective software projects.
 - Score in Gate /SET/NET
 - Placement
 - Any Competitive exams
 - In Software Engineer Job Role

Methods of instruction

- Lecture
- Discussion
- Group work
- PPT
- LMS

Workload

- Estimated amount of time student needs to spend on course readings (per week): **01 hour**
- Estimate amount of time to student needs to spend on course assignments and projects (per week): **45 minutes per week**

Assessment

S. No	Assessments	Assessment Methodology	No of assessments	Weightage in marks	Marks scaled to
	CIE	Quizzes	2	3	3
		Class test	2	2	2
		Assignment	3	3	3
		Course Activity	4	2	2
		Course Project	--	--	--
		Internal exams	2	20	20
	SEE	--	--	--	70

Note:

- Grades will be shared immediately .
- Absentees for class assessments: No Retest is conducted

Assessment

- Internal Exams-2
- Exams and quizzes:
 - Class Test -----2 (open book Test)
 - Quizzes----2 (multiple choice)[Kahoot]

Note:

- ✓ 1st class test and Quiz will be conducted before one week of 1st Mid Exam, Syllabus 1st mid portion.
- ✓ 2nd class test and Quiz will be conducted before one week of 2nd Mid Exam, Syllabus 2nd mid portion.
- **Assignments**
 - Which process model is suitable for the given application(**After 1st Unit**)
 - Draw the UML models for the given Application (**After 3rd Unit**)
 - Write the Test cases for the given Application(**After 4th Unit**)

Course Activity

Topic1:

- ✓ **Topic :** Effort Estimation and Risk Management
- ✓ **Activity :** **Group problem solving Activity**
- ✓ **schedule:** After completion of UNIT-I
- ✓ **Description of the Activity:** Individual project is given to each team. The team needs to calculate the effort estimation of the given project.

Topic2:

- ✓ **Topic :** Architecture Design
- ✓ **Activity:** **Think-Aloud Pair Problem**
- ✓ **schedule:** After completion of UNIT-II
- ✓ **Description of the Activity:** Each Team have to design the architecture for the given project

Topic3:

- ✓ **Topic:** OOAD Models
- ✓ **Activity:** **Team Based Learning Activity**
- ✓ **Schedule:** After completion of UNIT-III.
- ✓ **Description of the Activity:** Apply OOAD models for the given project

Topic4:

- ✓ **Topic:** Training, Documentation
- ✓ **Activity:** **Reciprocal Activity**
- ✓ **Schedule:** After completion of UNIT-IV.
- ✓ **Description of the Activity:** Demonstration of any automated testing tools.

Rubrics:

Metric	Problem solving skills(5Marks)	Participation(2.5 Marks)	Communication(2.5 Marks)
Very good	Innovative idea(5)	Very active(2.5)	Extreme(2.5)
Good	Suitable idea(4)	Active(2)	Active(2)
Poor	Partial solution(2)	Partial(1)	Partial(1)
Very Poor	No solution found(0)	No participation(0)	No communication(0)

Note: Assessments: Scaling column marks will considered as final marks

Key Concepts:

- ✓ Software Processing Models
- ✓ Software Architecture
- ✓ Design Tools, Software Life Cycle
- ✓ Software Project Testing
- ✓ Software Project Evaluation
- ✓ Software Project management

LESSON PLAN

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Define a plan to the software product by adopting suitable process model
2. Design a architecture for the given project
3. Create the programs according to programming standards.
4. Apply various testing strategies on the product.
5. Evaluate the product performance.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	3	3	1	1	1	1	1	1	1	2	2	3	3	3
CO2	3	3	1	3	3	2	2	3	3	3	1	3	3	3
CO3	3	3	3	2	3	2	3	3	3	2	1	3	3	3
CO4	3	1	1	1	3	2	2	3	2	3	2	2	3	3
CO5	3	3	2	3	3	2	2	3	2	2	1	3	3	3

Course Content (Syllabus)

Lecture No.	Topic	Delivery Method/ Activity
UNIT I		
1	Why Software Engineering? What Is Software Engineering	Lecture
2	How Successful Have We ,Been, What Is Good Software	Discussion, PPT
3	Who Does Software Engineering, A Systems Approach	Group work, PPT
4	An Engineering Approach	Lecture
5	Members of the Development Team, How Has Software Engineering Changed?	PPT
6	Modeling the Process and Life Cycle: The Meaning of Process, Software Process Models	PPT, Group work
7	Tools and Techniques for Process Modeling	PPT

8	Tracking Progress, Project Personnel	PPT
9	Effort Estimation, Risk Management, The Project Plan	Group problem solving Activity
UNIT II		
10	Capturing the Requirements: The Requirements Process	Lecture
12	Requirements Elicitation, Types of Requirements, Characteristics of Requirements,	PPT
13	Modeling Notations, Prototyping Requirements,	Lecture
14	Requirements Documentation ,Validation and Verification,	Lecture
15	The Design Process	Discussion
17	Decomposition and Views, Modeling Architectures,	PPT
18	Architectural Styles and Strategies	Think-Aloud Pair Problem Solving Activity
20	Achieving Quality Attributes, Documenting Software Architectures	Lecture ,PPT
21	Architecture Design Review	Lecture ,PPT
UNIT III		
23	Design Methodology, Design Principles	PPT
24	Object-Oriented Design	PPT
26	Representing Object-Oriented Designs in the UML	Team Based Learning Activity
1st Internal Exam		
28	Object-Oriented Design Patterns	Lecture ,PPT
30	Other Design Considerations, Object-Oriented Measurement	PPT
31	Design Documentation	PPT
32	Programming Standards and Procedures	Lecture ,PPT
33	Programming Guidelines, Documentation	PPT
34	The Programming Process	PPT

UNIT IV		
36	Software Faults and Failures, Testing Issues	Lecture ,PPT
37	Unit Testing, Integration Testing	Lecture
38	Testing Object-Oriented Systems, Test Planning	Discussion
39	Automated Testing Tools, When to Stop Testing	PPT
41	Principles of System Testing, Function Testing	Lecture
43	Performance Testing, Reliability, Availability, and Maintainability	Lecture
45	Acceptance Testing, Installation Testing, Automated System Testing	PPT
46	Test Documentation, Testing Safety-Critical Systems	PPT
47	Delivering the System: Training, Documentation	Reciprocal Activity
UNIT V		
48	Maintaining the System: The Changing System	PPT
50	The Nature of Maintenance, Maintenance Problems	PPT
52	Measuring Maintenance Characteristics, Maintenance Techniques and Tools	Lecture
54	Approaches to Evaluation, Selecting an Evaluation Technique	PPT
56	Assessment vs. Prediction, Evaluating Products	Group work
58	Evaluating Processes, Evaluating Resources	Lecture
2nd Internal Exam		

COVER PAGE

NETWORK SECURITY AND CRYPTOGRAPHY (CS116)

III B.Tech: II Sem

L: 4 T: - P: - C: 4

Name of the Instructor(s): **P.KUMARASWAMY, G.ROOPA**

No. of Hours/week: 4

Total number of hours planned: 62

Pre-requisite

- Computer networks
- Basics of computer

Learning Resources

Course notes, Handouts, Text books, online courses.

Required Resources

TEXT BOOKS:

1. William Stallings, "Cryptography & Network Security", Pearson Education, 4th Edition, 2010.
2. William Stallings and Lawrie Brown, "Computer Security: Principles and Practice", PHI, 2008

REFERENCE BOOKS:

1. Charlie Kaufman, Radia Perlman, Mike Speciner, "Network Security, Private communication in public world", PHI, 2nd edition, 2002.
2. Bruce Schneier, Neils Ferguson, "Practical Cryptography", Wiley Dreamtech India Pvt Ltd, 2003. Douglas R Simson "Cryptography – Theory and practice", CRC Press, 1995.

Web Links:

1. www.williamstallings.com/Security2e.html
2. <http://nptel.iitm.ac.in>

How to Contact Instructor:

- In-person office hours: 12:40 pm to 1:20 pm
- Online office hours: time and how to access
 - Kumara_swamy_p@srecwarangal.ac.in, goje.roopa@gmail.com (Evening 6:00 PM to 7:00 PM)
 - Phone numbers: 9848309647, 9059887683
- Optional: 4:00pm to 5:00pm (Tuesday, Wednesday)

Overview of Course:

- **What is the course about: its purpose?**

This course illustrates the cryptography techniques and modern technologies to deliver a sensitive data over a network securely.

- **What are the general topics or focus?**

Cryptography basics
Symmetric key cryptography
Asymmetric key cryptography
PGP,S/MIME
SSL, IP security
Viruses, Firewalls.

- **How does it fit with other courses in the department or on campus?**

This subject is very useful to develop any software projects securely in programming courses like C, C++ and JAVA, .Net.

- **Why would students want to take this course and learn this material?**

In current scenario, this subject is very useful to learn the important courses like Ethical hacking, information security etc..

Methods of instruction

- Lecture
- Discussion
- PPT
- Videos

Workload

- Estimated amount of time student needs to spend on course readings (per week): **(2 hours)**
- Estimate amount of time to student needs to spend on course assignments and projects (per week): **(1 hour)**

Assessment

S. No	Assessments	Assessment Methodology	No of assessments	Wheightage in marks	Marks scaled to
	CIE	Quizzes	02	05	05
		Class test			
		Assignment	02	05	05
		Course Activity			
		Course Project			
		Internal exams	2	10	20
	SEE	--	--	--	70

Topic	Activity	UNIT	Schedule	Mode	Rubrics
1. Security attacks, services and mechanisms 2. Classical encryption techniques 3. Authentication functions 4. Public key cryptography	Assignment-I	I,II,III	9th Week	Offline	5 Questions each 2 Marks
1. E-mail security 2. IP security 3. Web security 4. Firewalls 5. Intruders 6. Viruses	Assignment-II	IV,V	16th week	Offline	5 Questions each 2 Marks
Scale					5 marks

Topic	Activity	UNIT	Schedule	Rubrics
<ul style="list-style-type: none"> • Security attacks, services and mechanisms • Classical encryption techniques • Authentication functions • Public key cryptography 	Quiz	I,II,III	9th Week	10 questions each 0.5 mark
<ul style="list-style-type: none"> • E-mail security • IP security • Web security • Firewalls 	Quiz	IV,V	16th Week	10 questions each 0.5 mark
Scale				5 Marks

Ground Rules for Assignment:

- Absentees for class assessments:
 - With HOD permission Re-conduction of the Quiz/Assignment will be done within next two working days from 4:00 PM to 5:00PM, Assignment/Quiz mark is evaluated for 75% of original marks.
 - Students who have taken prior permission from the HOD, re-conduction of the Class Assessment will be done within next two working days from 4:00 PM to 5:00PM Assignment/Quiz mark is evaluated for original mark

Key concepts

- Security attacks, services and mechanisms
- Classical encryption techniques
- Authentication functions
- Public key cryptography
- E-mail security
- IP security
- Web security
- Firewalls

LESSON PLAN

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Explore to the different system attacks and viruses.
2. Apply the concepts of private and public encryption techniques.
3. Explain the key management and Authentication services.
4. Explain the IP security and web security concepts.
5. Design an effective intrusion detection systems and trusted systems through firewall architecture

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	1	3	2	2	2								3	2
CO2	2		2	1	3								2	3
CO3	2		3	1									2	3
CO4	2	2	3	1									3	2
CO5	2	2	3	1	2								2	3

Syllabus

UNIT – I

Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques – SDES – Block cipher Principles- DES – Strength of DES
Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – RC4 -
Differential and linear cryptanalysis – Placement of encryption function – traffic confidentiality

UNIT – II

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS.

UNIT –III

Public key cryptography and RSA – Key distribution – Key management – Diffie Hellman key exchange .
Authentication applications – Kerberos – X.509

UNIT – IV

Authentication services - E-mail security (Pretty Good Privacy (PGP) and S/MIME).
IP security - IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.
Web security- Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

UNIT – V

Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security.

Lecture No.	Topic	Delivery Method/ Activity
UNIT - I		
1	Model of network security, Security attacks	Discussion, PPTs
2	Security Services and Mechanisms	Discussion, PPTs
3	OSI security architecture	chalk & talk/PPTs
4	Classical encryption techniques	Chalk & talk/PPTs
5	SDES	Discussion, PPTs
6	Block cipher Principles DES – Strength of DES Block cipher design principles	Chalk & talk/PPTs
7	Block cipher mode of operation – Evaluation criteria for AES	Discussion, PPTs
8	RC4 - Differential and linear cryptanalysis	Discussion, PPTs
9	Placement of encryption function – traffic confidentiality	Chalk & talk/PPTs
UNIT - II		
10	Authentication requirement – Authentication function – MAC	Discussion, PPTs
11	Authentication requirement – Authentication function – MAC	Chalk & talk/PPTs
12	Hash function – Security of hash function and MAC	Chalk & talk/PPTs
13	SHA - HMAC – CMAC	Discussion, PPTs
14	SHA - HMAC – CMAC	Chalk & talk/PPTs

15	Digital signature and authentication protocols – DSS.	Chalk & talk/PPTs
16	Digital signature and authentication protocols – DSS.	Chalk & talk/PPTs
	UNIT - III	
17	Public key cryptography and RSA	Discussion, PPTs
18	Key distribution – Key management	Discussion, PPTs
19	Diffie Hellman key exchange .	Chalk & talk/PPTs
20	Authentication applications – Kerberos	Chalk & talk/PPTs
21	Authentication applications – Kerberos	Chalk & talk/PPTs
22	X.509	Discussion, PPTs
	Assignment-I for UNIT-I,II,III	Quiz Activity for I ,II and III Units
	I- Mid Examination	
	UNIT - IV	
23	Authentication services - E-mail security (Pretty Good Privacy (PGP) and S/MIME).	Discussion, PPTs
24	Authentication services - E-mail security (Pretty Good Privacy (PGP) and S/MIME).	Chalk & talk/PPTs
25	IP security - IP Security Overview, IP Security Architecture,	Discussion, PPTs
26	Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.	Chalk & talk/PPTs
27	Web security- Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).	Discussion, PPTs

28	Web security- Web Security Requirements	Chalk & talk/PPTs
29	Secure Socket Layer (SSL) and Transport Layer Security (TLS)	Chalk & talk/PPTs
30	Secure Electronic Transaction (SET).	Chalk & talk/PPTs
	UNIT – V	
31	Intruder – Intrusion detection system	Discussion, PPTs
32	Virus and related threats	Chalk & talk/PPTs
33	Countermeasures	Chalk & talk/PPTs
34	Firewalls design principles	Discussion, PPTs
35	Trusted systems	Chalk & talk/PPTs
36	Practical implementation of cryptography and security.	Discussion, PPTs
	Assignment-II for UNIT-IV,V	Quiz Activity for IV and V Units
	II- Mid Examination	

ARTIFICIAL INTELLIGENCE (18CS108)

(Professional Elective I)

III B.Tech: II Sem

L: 3 T: P: C: 3

Name of the Instructor(s) **S Naresh Kumar, Dr. V. Venkataramana**

No. of Hours/week: 3

Total number of hours planned: 45

Pre-requisite

- Probability and statistics
- Basic knowledge on any programming language

Learning Resources

Course notes and web resources

Required Resources

TEXT BOOK

1. George F Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Fourth Edition, Pearson Education
2. Rich and Knight, Artificial Intelligence, McGraw Hill Publication

REFERENCE BOOK

1. The Emotion Machine: Commonsense Thinking, Artificial Intelligence, and the Future of the Human Mind , Marvin Minsky.
2. Artificial Intelligence: a modern approach, S. Russell and P. Norvig, Prentice Hall.
3. Artificial Neural Networks” by B Yegnanarayana, PHI.

Web links

1. <http://www.cs.toronto.edu/~fbacchus/csc384/Lectures/lectures.html>
2. <http://mathalope.co.uk/udacity-intro-to-artificial-intelligence-notes/>
3. <https://www.udemy.com/course/artificial-intelligence-az/>

How to Contact Instructor:

- In-person office hours:
 - Instructor 1: S Naresh Kumar**
 - Every Wednesday - 2:30 to 4:00 pm (cabin)
 - Friday & Saturday - 4:00 pm to 5:00pm(cabin)
 - Instructor 2: Dr. V. Venkataramana**
 - Every Wednesday - 2:30 to 4:00 pm (cabin)
 - Monday & Tuesday - 4:00 pm to 5:00pm(cabin)
- Online office hours: time and how to access
 - **Instructor 1: S Naresh Kumar**
 - Naresh_kumar_s@srecwarangal.ac.in
 - 9866000203 (Only text message)
 - Google classroom(5:30 to 8:00 pm)
 - **Instructor 2: Dr. V. Venkataramana**
 - **venkataramana_v@srecwarangal.ac.in**
 - 85000962470 (Only text message)
 - Google classroom(5:30 to 8:00 pm)

Technology Requirements: (optional)

- Laptops for class work
- Software (Jupyter Notebook- Python)
- Learning management system (Google classroom)

Overview of Course:

- **What is the course about: its purpose?**

Artificial intelligence, or **AI**, is the **use of** computer science programming to imitate human thought and action by analyzing data and surroundings, solving or anticipating problems and learning or self-teaching to adapt to a variety of tasks

Purpose: Impact of **AI** has been on the education industry, the manufacturing industry, and the entertainment industry. With the help of **AI**, many human manufacturing activities, have been partially or completely replaced. In order to sustain in the IT market, students needs to have exposure towards currents trends and issues in Artificial Intelligence.

- **What are the general topics or focus?**
 - a. AI Application Areas ,Predicate calculus , Heuristic Search,Agent Based
 - b. Genetic algorithm, Rule Based Expert System, Machine learning, Role of Knowledge in Language understanding

- **How does it fit with other courses in the department or on campus?**
 - AI applications deal with multidisciplinary approaches. With the available course content, students can enhance their technical and cooperative skills.
- **Why would students want to take this course and learn this material?**
 - In future many education and entertainment industries, human manufacturing activities can be partially or completely replaced with AI applications

Methods of instruction

- Lecture (chalk & talk / ICT)
- Collaborative Learning (Pass MIC.)

Workload

- Estimated amount of time student needs to spend on course readings (per week) : 2 hours
- Estimate amount of time to student needs to spend on course assignments and projects 1-2 hours

Assessment

S. No	Assessments	Assessment Methodology	No of assessments	Weightage in marks	Marks scaled to
	CIE	Quizzes	2	10	5
		Class test / Course activity	1	10	5
		Course Project	--	--	--
		Internal exams	2	20	20
	SEE	--	--	--	70

Note:

- Class test/ Quiz – to be conducted as per scheduled date
- Grades will be shared immediately for online test and 3 days for offline activities.
- Absentees for class assessments
Zero marks are assigned to the students who are absent for Quizzes /Class test

SNo.	Activity	Schedule	Weightage	Rubrics
1	Activity : Pass the MIC	2 nd Week (after completion of Unit I)	NIL	—
2	Activity : Quiz will be conducted through Google classroom	4 th Week(after completion of Unit I & II)	10	20 questions each carry 0.5 mark
3	Activity : Pass the MIC	7 th Week (after completion of Unit III)	NIL	—
4	Activity : Class Test will be conducted through offline	9 th Week(after completion of Unit III & IV)	10	5 questions each carry 2 mark
5	Activity : Pass the MIC	11 th Week(after completion of Unit V)	NIL	—
6	Activity : Quiz will be conducted through Google classroom	13 th Week(after completion of Unit V&VI)	10	20 questions each carry 0.5 mark
Quiz Scaled to				5 Marks
Class Test Scaled to				5 Marks

Key concepts

- a. AI Application Areas ,Predicate calculus , State Space Search, Heuristic Search
- b. Agent Based, Genetic algorithm, Rule Based Expert System, stochastic Approach to Uncertainty
- c. Machine learning, Role of Knowledge in Language Understanding

LESSON PLAN

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Apply the problem space, knowledge to design an effective production system.
2. Enhance the knowledge representation and can design logic by applying knowledge rules.
3. Apply, analyze and evaluate the expert systems.
4. Apply reasoning to construct traceable and non traceable problems.
5. Analyze and understand the computational trade-offs involved in applying different AI techniques and models.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	1				1			2	2				1	1
CO2	2	2			1			1	1				1	2
CO3				2	2			2	2			1	2	2
CO4			2					2	2				1	1
CO5			2					2	2			2	3	2

Course Content (Syllabus)

Lecture No.	Topic	Delivery Method/ Activity
UNIT -I		
1	Introduction to AI , Attitude towards Intelligence	Chalk &Talk
2	Knowledge and Human Artifacts	Chalk &Talk
3	Overview of AI Application Areas.	PPTS
4	Propositional Calculus	Chalk &Talk
5	Predicate Calculus	Chalk &Talk
6	Inference Rules to produce predicate calculus expression	Chalk &Talk
7	A Logic Based Financial Advisor	PPTS
	Activity : Pass the MIC (3rd Week)	

	UNIT II	
8	Structures and Strategies For State Space Search : Introduction	Chalk & Talk
9	Graph Theory	Chalk & Talk
10	Strategies for State Space Search	Chalk & Talk
11	State Space to represent reasoning with the predicate calculus	Chalk & Talk
12	An algorithm for Heuristic Search	PPTS
13	Admissibility, Monotonicity and Informedness,	Chalk & Talk
14	Heuristic in games	PPTS
15	Complexity issues	PPTS
Activity : Quiz will be conducted through Google classroom(5th Week)		
	UNIT III	
16	Control and Implementation of State Space Search	PPTS
17	Recursion Based Search	Chalk & Talk
18	Pattern Directed Search	Chalk & Talk
19	Production Systems, Blackboard Architecture for problem solving	PPTS
20	Knowledge Representation: Issues	PPTS
21	AI Representational systems	PPTS
22	Conceptual Graphs, Explicit Representation	PPTS
23	Agent Based and Distributed Problem Solving Expert Systems	Chalk & Talk
24	Genetic Algorithms	Chalk & Talk
Activity : Pass the MIC(8th Week)		
	UNIT IV	
25	Strong Method Problem Solving: Introduction	PPTS
26	Overview of Expert System, Rule Based Expert System	PPTS
27	Model, Case Based and Hybrid Systems	PPTS
28	Planning ,Reasoning in Uncertain Situations	PPTS
30	Logic based abductive Inference	PPTS

31	Abduction – Alternate Logic	PPTS
32	The stochastic Approach to Uncertainty	PPTS
Activity : Class Test will be conducted through offline(10th Week)		
UNIT V		
33	Machine Learning: Introduction	PPTs
34	Framework for Symbol based Learning	PPTs
35	ID3 Decision Tree Induction Algorithm	Chalk & Talk
36	Knowledge and Learning	PPTS
37	Unsupervised Learning	PPTS
Activity : Pass the MIC(13th Week)		
UNIT VI		
38	Understanding Natural Language	Chalk & Talk
39	Role of Knowledge in Language Understanding	Chalk & Talk
40	Symbolic analysis ,syntax	PPTS
41	Syntax and Knowledge with ATN Parsers	PPTS
42	Natural Language Applications	PPTS
Activity : Quiz will be conducted through Google classroom(15th Week)		

COMPILER DESIGN

III B.Tech: II Sem

L:4 T: P: C:

Name of the Instructor(s): G. Sunil Reddy, Md. Sallauddin, R. Ravi Kumar

No. of Hours/week: 4

Total number of hours planned: 60

Pre-requisite

- Knowledge of automata theory
- Context free languages
- Computer architecture
- Data structures and simple graph algorithms

Learning Resources

- Textbooks, Class Notes

Required Resources:

Text Books:

1. Alfred V.Aho, Ravi Sethi and Jeffry D. Ullman “Compiler Principles, Techniques and Tools”16th Indian Reprint, Pearson Education Asia, ISBN No.81-7808-046-X.,2004.
2. D.M.Dhamdhere ”Compiler Construction“, 2nd Edition ” Mac Mellon India Ltd”, ISBN No.0333 -90406-0,1997

Reference Books:

1. Donovan,”Systems programming”, Mc. Graw Hill.
2. Leland L. Beck, “System Software – An Introduction to Systems Programming” Addison Wesley.

Reading materials:

1. Online Video links

Additional Resources (links etc):

1. <https://www.geeksforgeeks.org/compiler-design-tutorials/>
2. <https://nptel.ac.in/courses/106108052/>
3. https://www.amazon.in/gp/browse.html?node=4149418031&ref =nav_em_T1_0_4_NaN_7_sbc_books_textbooks

How to Contact Instructor:

- **In-person office hours:** (Common for all instructors)
 - Students can meet, whenever we have free schedule during the college hours. Specifically on working Wednesday and Saturday during 3 p.m. to 4 p.m.
 - Can meet 4:00 pm to 5:00 pm in working college hours with prior approval.
- **Online office hours: time and how to access**

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Faculty Name	:	R. Ravi Kumar
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(Phone Number)	:	+91 9989916656
Contact Hours	:	Wednesday : 2:30 to 4:00 PM
	:	Saturday : 2:30 to 4:00 PM

Technology Requirements:

- Learning management system (Google classroom/ Google Forms)

Overview of Course:

- **What is the course about: its purpose?**

Compiler design principles provide an in-depth view of translation and optimization process. **Compiler design** covers basic translation mechanism and error detection & recovery. It includes lexical, syntax, and semantic analysis as front end, and code generation and optimization as back-end
- **What are the general topics or focus?**
 1. Phases of compiler
 2. Lexical Analysis
 3. Parsing Techniques
 4. Intermediate Code Generation
 5. Code Optimization
 6. Code Generation
- **How does it fit with other courses in the department or on campus?**

Compilers have become part and parcel of today's computer systems. They are responsible for making the user's computing requirements, specified as a piece of program, understandable to the underlying machine. Their tools work as interface between the entities of two different domains- the human being and the machine. This course is useful for all the programming languages.

- **Why would students want to take this course and learn this material?**
 1. Helps the student to improve problem solving skill
 2. Helps in learning further programming languages
 3. Helps to develop compiler
 4. As it a logical oriented, students will be able to improve logical thinking

Methods of instruction:

- Lecture (chalk & talk / ICT/ PPT)

Workload:

- Estimated amount of time student needs to spend on course readings (per week): 2 hours per week
- Estimate amount of time to student needs to spend on Homework for practicing the problems (per week) : 2 Hours per week

Assessment:

S. No	Assessments	Assessment Methodology	No of assessments	Weightage in marks	Marks scaled to
	CIE	Quizzes	5	2.5	5
		Class test	--	--	
		Assignment	2	2.5	
		Course Activity	--	--	--
		Attendance	--	--	5
		Internal exams	2	20	20
	SEE	--	--	--	70

Note:

Quiz/ Assignment – schedule:

Topic	Activity	Rubrics	UNIT	Schedule
Summary of questions will be framed for each unit	Online Quiz	10 Questions will be displayed one mark each (10)	For All Units	After the completion of each Unit
Finite Automata & Top Down Parsing	Assignment	10 Questions will be given one mark each	I & II	7 th week
Bottom Up Parsing & Semantic Analysis	Assignment	10 Questions will be given one mark each	III & IV	11 th week

Assignments-

//Absentees for class assessments

In-time Assignments	2.5 marks
Late assignment within 5 days	2 Marks
Late Assignments even after 5 days	New set of questions will be given (With highest mark as 1.5) with a deadline. In case the assignment is not submitted in time then he/she will given zero marks

Quiz –

- The marks allotted for quiz will be graded to assignment
- Since the assessment is through online the results will be displayed to the students immediately

// Absentees for class assessments

Absentees for Quiz	In case the student is absent then a complex problem will be given as an assignment with a deadline, in case the assignment is not submitted in time then he/she will given zero marks
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Key concepts:

1. Compiler
2. Assembler, Translator
3. Lexical Analysis
4. Syntax Analysis
5. Semantic Analysis
6. Intermediate Code Generator
7. Code Optimizer
8. Code Generator

LESSON PLAN

Course Outcomes (COs):

At the end of the course the student should be able to:

1. **Understand** various concepts in different phases of compiler
2. **Apply** practical aspects of automata theory in compiler phases
3. **Apply** the lexical, syntax, semantic rules to design error free compiler
4. **Analyze** code optimization techniques and utilization of registers to develop an effective and optimal code
5. **Evaluate** the knowledge of different phases in designing a compiler

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
Understand various concepts in different phases of compiler	3	3	2									2	3	2
Apply practical aspects of automata theory in compiler phases	3	3	3	1					3				2	3
Apply the lexical, syntax, semantic rules to design error free compiler			3	2	2				2				2	2
Analyze code optimization techniques and utilization of registers to develop an effective and optimal code			3						2				2	2
Evaluate the knowledge of different phases in designing a compiler	2	3	3	2	2				2		2		3	2

COURSE SYLLABUS

UNIT I

Introduction to Compiling: Compiler, Phases of a compiler, Analysis of the source program, Cousins of the compiler, grouping of phases, Compiler writing tools.

Lexical Analysis: The role of the lexical analyzer, Specification of tokens. Recognition of tokens, A Language for specifying lexical Analyzers, Finite automata, Optimization of DFA-based pattern matchers.

UNIT II

Syntax Analysis: The role of a parser, Context-free grammars, writing a grammar, Parsing, Ambiguous grammar, Elimination of Ambiguity, Classification of parsing techniques

Top down parsing: Back Tracking, Recursive Descent parsing, FIRST () and FOLLOW () - LL Grammars, Non-Recursive descent parsing, Error recovery in predictive parsing.

UNIT III

Bottom Up parsing: SR parsing, Operator Precedence Parsing, LR grammars, LR Parsers – Model of an LR Parsers, SLR parsing, CLR parsing, LALR parsing, Error recovery in LR Parsing, handling ambiguous grammars.

UNIT IV

Syntax Directed Translation: Syntax Directed Definition, S-attributed definitions, L-attributed definitions, Attribute grammar, S-attributed grammar, L-attributed grammar.

Semantic Analysis: Type Checking, Type systems, Type expressions, Equivalence of type expressions.

Intermediate Code Generation: Construction of syntax trees, Directed Acyclic Graph, Three Address Codes.

UNIT V

Runtime Environments: Storage organization, Storage-allocation strategies, Symbol tables, Activation records.

Code Optimization: The principal sources of optimization, Basic blocks and Flow graphs, data-flow analysis of flow graphs.

Code Generation: Issues in the design of a code generator, the target machine code, Next-use information, a simple code generator, Code-generation algorithm.

TEXT BOOKS:

1. Alfred V.Aho, Ravi Sethi and Jeffry D. Ullman “Compiler Principles, Techniques and Tools” 16th Indian Reprint, Pearson Education Asia, ISBN No.81-7808-046-X.,2004.
2. D.M.Dhamdere ”Compiler Construction“, 2nd Edition ” Mac Mellon India Ltd”, ISBN No.0333 -90406-0,1997

REFERENCE BOOKS:

1. Donovan, "Systems programming", Mc. Graw Hill.
2. Leland L. Beck, "System Software – An Introduction to Systems Programming" Addison Wesley.

WEB LINKS:

1. <https://www.geeksforgeeks.org/compiler-design-tutorials/>
2. <https://nptel.ac.in/courses/106108052/>
3. https://www.amazon.in/gp/browse.html?node=4149418031&ref_=nav_em_T1_0_4_NaN_7_sbc_books_textbooks

LESSON PLAN

Lecture No.	Topic	Delivery Method/ Activity
UNIT-I		
1	Introduction to Compiling	Chalk & Talk
2 & 3	The phases of a compiler	Chalk & Talk / PPT
4	Analysis of the source program	Chalk & Talk
5	Cousins of the compiler	Chalk & Talk
6	Grouping of phases	Chalk & Talk
	Compiler writing tools	Chalk & Talk
7	Lexical Analysis: The role of the lexical analyzer	Chalk & Talk
8	Specification of tokens	Chalk & Talk
9	Recognition of tokens	Chalk & Talk
10	A Language for specifying lexical Analyzers	Chalk & Talk
11 & 12	Finite automata	Chalk & Talk
13	Optimization of DFA-based pattern matchers	Chalk & Talk
Quiz will be conducted for UNIT I through Google classroom / Google forms		
UNIT-II		
14	Syntax Analysis: The role of a parser	Chalk & Talk
15	Context-free grammars	Think-Pair-Share / Chalk & Talk
16	Writing a grammar	Chalk & Talk
	Parsing	Chalk & Talk

17 & 18	Ambiguous grammar, Elimination of Ambiguity	Brain storming/ Chalk & Talk
19	Classification of parsing techniques	Chalk & Talk
20	Top down parsing –Back Tracking	Chalk & Talk
21	Recursive Descent parsing	Chalk & Talk
22&23	FIRST() and FOLLOW()- LL Grammars	Role Play/ Chalk & Talk
24	Non-Recursive descent parsing	Chalk & Talk
25	Error recovery in predictive parsing	Chalk & Talk
ASSIGNMENT I		
Quiz will be conducted for UNIT II through Google classroom / Google forms		
LL(k) problems solving using Think-Pair-Share activity		
UNIT-III		
26	Bottom Up parsing- SR parsing	Chalk & Talk
27	Operator Precedence Parsing	Chalk & Talk
28	LR grammars	Chalk & Talk
29	LR Parsers – Model of an LR Parsers	Chalk & Talk
30 & 31	SLR parsing	Chalk & Talk
I Mid Term Examinations		
32 &33	CLR parsing	Chalk & Talk
34	LALR parsing	Chalk & Talk
35	Error recovery in LR Parsing	Chalk & Talk
36	Handling ambiguous grammars	Chalk & Talk
Quiz will be conducted for UNIT III through Google classroom / Google forms		
LR Grammars problems solving using Think-Pair-Share activity		
UNIT-IV		
37	Syntax Directed Translation	Chalk & Talk
38	Syntax-directed definition	Chalk & Talk
39	S-attributed definitions, L-attributed definitions	Chalk & Talk
40	Attribute grammar	Chalk & Talk

41	S-attributed grammar, L-attributed grammar	Chalk & Talk
42	Semantic Analysis: Type Checking	Chalk & Talk
43	Type systems, Type expressions, Equivalence of type expressions	Chalk & Talk
44	Intermediate Code Generation	Chalk & Talk
45	Construction of syntax trees	Chalk & Talk
46	Directed Acyclic Graph	Chalk & Talk
47	Three Address Codes	Chalk & Talk
ASSIGNMENT II		
Quiz will be conducted for UNIT IV through Google classroom / Google forms		
UNIT-V		
48	Runtime Environments	PPT
49	Storage organization	PPT
50	Storage-allocation strategies	PPT
51	Symbol tables	PPT
52	Activation records	PPT
53 & 54	Code Optimization: The principal sources of optimization	PPT
55	Basic blocks and Flow graphs	PPT
56	Data-flow analysis of flow graphs	PPT
57	Code Generation: Issues in the design of a code generator	PPT
58	The target machine code	PPT
59	Next-use information, A simple code generator	PPT
60	Code-generation algorithm	PPT
Quiz will be conducted for UNIT V through Google classroom / Google forms		
II Mid Term Examinations		