MGM University

Vision

- To ensure sustainable human development which encourages self-reliant and self-content society.

- To promote activities related to community services, social welfare and also Indian heritage and culture.

- To inculcate the culture of non-violence and truthfulness through vipassanna meditation and Gandhian Philosophy.

- To develop the culture of simple living and high thinking

Mission

- To impart state of art education and technical expertise to students and give necessary training to teachers to create self-reliant society for future.

- To encourage students to participate in Indian and International activities in sports, literature, etc. so that future generation becomes base for free and liberal society

- To educate students in areas like Management, Finance, Human relations to inculcate philosophy of simple living and high thinking value of simple economic society.

- To inculcate culture of non-violence and truthfulness through Vipassana.

  To sustain activities of Indian culture (viz. classical dance, music and fine arts) through establishing institutes like Mahagami, Naturopathy, etc.

विद्यापीठ गीत

अत्त दिप भव भव प्रदिप भव,

स्वरूप रूप भव हो

ज्ञान सब्ब विज्ञान सब्ब भव ,

सब्ब दिप भव हो

अत्ताहि अत्त नो नाथो ,

अत्ताहि अत्त नो गति

अत्त मार्गपर अप्रमादसे है तुझे चलना

सब्ब का कल्याण हो ,

वो कार्यकुशल करना

सब्ब का उत्तम मंगल , पथप्रदर्शक हो

अत्त दिप भव भव प्रदिप भव ,

स्वरूप रूप भव हो

ज्ञान सब्ब विज्ञान सब्ब भव ,

सब्ब दिप भव हो

बुद्धमं शरनं गच्छामि :

धम्मं शरनं गच्छामि :

संघं शरनं गच्छामि :

Dr. G. Y. Pathrikar College of Computer Science & Information Technology

MGM college of Computer Science and Information Technology was established in 2001 offering undergraduate and postgraduate degree program in Computer Science and Information Technology. College was renamed as Dr.G.Y.Pathrikar College of Computer Science and Information Technology in 2003 in memory of great educationalist, one of the founder member and Ex-Secretary MGM, Dr.G.Y.Pathrikar Sir.

It is first self-financed ISO certified institution offering program dedicated to Computer science and Information technology in Maharashtra and has achieved status of 2f/12b. Ours was the only and first college to be re-accredited as A+ grade with NAAC in the year 2017. Experienced and qualified faculty with Ph.D is strength of our college. Starting with 77 student's College has crossed total students strength of 10,000 passing out. Student are doing well in various MNCs like Infosys, Tech-Mahindra, Wipro, Capgemini, Cognizant etc. Many have their own Startups. Some of the students have completed their Masters and Ph.D. program from foreign countries like US, UK, Australia. Now we are constituent college of MGM University, Chhatrapati Sambhajinagar.

Vision

To be an academic institution in dynamic equilibrium in social, ecological and economical environment striving continuously for excellence in total quality education, research and technological service to the nation.

Mission

- To create and sustain a community of learning in which students acquire knowledge and learn to apply it professionally with due consideration for ethical, and economical issues.
- To upgrade our students in all respect with the help of latest infrastructure in the area of Computer Science and Information Technology in order to build the National Capabilities.
- To understand the culture of Non-violance, truth, peace through Gandhian Philosophy.

Programs offered at Dr. G. Y. Pathrikar College of Computer Science & Information Technology

Undergraduate Programmes	Postgraduate Programmes	PhD Programmes
B.Sc(Computer Science) Honours / Honours with Research	M.Sc(Computer Science)	Ph.D. in Computer Science and Information Technology
B.Sc(Information Technology) Honours/ Honours with Research	M.Sc(Information Technology)	
BCA(Science) Honours / Honours with Research	M.Sc(Data Science)	
B.Sc(Animation) Honours / Honours with Research	M.Sc(Animation)	
Integrated M.Sc. Data Science		
BCA(Digital Marketing) Honours		
B.Sc(Robotics) Honours		

Name of Program – B.Sc. (Information Technology) Honours / Honours with Research

Duration – Four Years

Eligibility -

- He / She Must have passed the Higher Secondary (Multipurpose) Examination conducted by H.S.C. Board Government of Maharashtra with Science / Technical Subjects or an Examination of any statutory University and Board recognized as equivalent thereto.

OR

- Candidates having offered prescribed vocational courses, (MCVC) with Computer Techniques / Information Technology / Electronics.

OR

- Three Years Course in Diploma Engineering conducted by the Board of Technical Education, Maharashtra State. He / She must have passed at qualifying examination.

Name of Faculty: **Faculty of Basics and Applied Science**
Name of the College/Institute/Department/School: Dr. G.Y Pathrikar College of CS & IT MGMU
Name of the Programme: **B.Sc. (Information Technology) Honours / Honours with Research**
Programme Type (UG/PG): **UG**
Duration: 04 Years (08 Semesters)

List of Options to select from Bucket of Courses provided in various categories:

Major	
Information Technology	
Core Major	**Core Elective**

Minor options for basic and applied science Faculty	**GYP**	**IBT**	**UDBAS**
	Cyber Security	Food Technology and Processing	Chemistry
	Robotics	Microbiology	Geo-Informatics
	Data Analytics	Biotechnology	Mathematics
	Block-Chain Technologies	Bioinformatics	Statistics
		Food Nutrition and Dietetics	Material Science

	Faculty of Engineering and Technology	**Faculty of Social Sciences & Humanities**	**Faculty of Design**	**Faculty of Management and Commerce**	**Interdisciplinary Faculty**	**Performing Arts**
Minor options from Other Faculty	Data Science	Filmmaking	Product Design	Financial Management	Cosmetic Technology	Theatre Arts
	IoT	Photography	Interior Design	E-Commerce	Education	Dance
	Geo-informatics and Applications	Mass Communication and Journalism	Contemporary Arts	International Business Management	Yog Sciences	Music
	EV Technology	Psychology	Visual Communication	Hospitality Mgmt	Physical Education	Folk Art
	Drone Technology	Economics	Fashion Technology	Travel and Tourism	Home Science	
	Robotics Technology	English		Art of Leadership		
	Chemical Technology	Social Work		Art of Business		
	AI&ML					
	Universal Human Values					
	Energy management					

First Year - Semester I												
Course Category	**Course Code**	**Course Title**	**Nature of Course**	**No. of Credits**	**Teaching (Contact hrs/ week)**		**Evaluation Scheme (Marks)**			**Minimum Passing (Marks)**		
					L	**P**	**Internal**	**External**	**Total**	**Internal**	**External**	**Total**
MM	ITH41MML101	Introduction to Information and Communication Technology	Theory	2	2		30	20	50	-	08	20
MM	ITH41MML102	Computer Architecture	Theory	2	2		30	20	50	-	08	20
MM	ITH41MMP101	Practical based on Information and Communication Technology	Practical	1		2	30	20	50	-	08	20
MM	ITH41MMP102	Practical based on Computer Architecture	Practical	1		2	30	20	50	-	08	20
IKS	ITH41IKT101	Indian Psychology and yoga	Theory	2	2	-	30	20	50	-	08	20
AEC		Basket of AEC From University	Theory	2	2	-	30	20	50	-	08	20
OE		Basket of OE From University	Theory	2	2	-	30	20	50	-	08	20
OE		Basket of OE From University	Theory	2	2	-	30	20	50	-	08	20
VSC	ITH41VSP101	C Programming	Practical	2		4	30	20	50	-	08	20
SEC	ITH41SEL101	Programing Logic and Design	Theory	2	2	-	30	20	50	-	08	20
VEC		Basket of VEC From University	Theory	2	2	-	30	20	50	-	08	20
CC		Basket of CC From University	Practical	2		4	30	20	50	-	08	20
Total				**22**	**16**	**12**	**360**	**240**	**600**			

Note:

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation,**Course Category: M**M-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

First Year - Semester II

Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	Exte rnal	Total
MM	ITH41MML103	Database Management System	Theory	2	2		30	20	50		08	20
MM	ITH41MML104	Data Structure	Theory	2	2		30	20	50		08	20
MM	ITH41MMP103	Practical based on DBMS	Practical	1		2	30	20	50		08	20
MM	ITH41MMP104	Practical based on Data Structure	Practical	1		2	30	20	50		08	20
MI		Basket of MI From University	Theory	2	2	-	30	20	50		08	20
AEC		Basket of AEC From University	Theory	2	2	-	30	20	50		08	20
OE		Basket of OE From University	Theory	2	2	-	30	20	50		08	20
OE		Basket of OE From University	Theory	2	2	-	30	20	50		08	20
VSC	ITH41VSP102	Web Fundamental	Practical	2		4	30	20	50		08	20
SEC	ITH41SEL102	Operating System	Theory	2	2	-	30	20	50		08	20
VEC		Basket of VEC From University	Theory	2	2	-	30	20	50		08	20
CC		Basket of CC From University	Practical	2		4	30	20	50		08	20
Total				**22**	**16**	**12**	**390**	**260**	**650**			

Note:
Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation, **Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

Level 4.5 Award of UG certificate with 40 credits and an additional 4-credits core NSQF course / internship OR continue with major and minor

Second Year - Semester III

Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	ITH41MML201	Data Warehousing	Theory	2	2	-	30	20	50		08	20
MM	ITH41MML202	Object Oriented Programing Using C++	Theory	2	2	-	30	20	50		08	20
MM	ITH41MML203	Statistical Method	Practical	2	2	-	30	20	50		08	20
MM	ITH41MMP201	Practical Based on Data warehousing	Practical	1	-	2	30	20	50		08	20
MM	ITH41MMP202	Practical Based on Object Oriented Programing Using C++	Theory	1	-	2	30	20	50		08	20
OE		Basket of OE From University	Theory	2	2	-	30	20	50		08	20
MI		Basket of MI From University	Theory	3	3	-	60	40	100		16	40
MI		Basket of MI From University	Theory	1	-	2	30	20	50		08	20
AEC		Basket of AEC From University	Practical	2	2	-	30	20	50		08	20
VSC	ITH41VSP201	Advance Excel	Theory	2		4	30	20	50		08	20
FP	ITH41FPJ201	Field Project	Theory	2		4	30	20	50		08	20
CC		Basket of CC From University	Practical	2		4	30	20	50		08	20
Total				**22**	**13**	**18**	**390**	**260**	**650**			

Note:

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation,**Course Category: M**M-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
Second Year - Semester IV												
					L	P	Internal	External	Total	Internal	External	Total
MM	ITH41MML204	Data Mining	Theory	2	2	-	30	20	50		08	20
MM	ITH41MML205	Core Java	Theory	2	2	-	30	20	50		08	20
MM	ITH41MML206	Software Engineering	Theory	2	2	-	30	20	50		08	20
MM	ITH41MMP203	Practical Based on Data Mining	Practical	1	-	2	30	20	50		08	20
MM	ITH41MMP204	Practical Based on Core Java	Practical	1	-	2	30	20	50		08	20
OE		Basket of OE From University	Theory	2	2	-	30	20	50		08	20
MI		Basket of MI From University	Theory	3	3	-	60	40	100		16	40
MI		Basket of MI From University	Practical	1	-	2	30	20	50		08	20
AEC		Basket of AEC From University	Theory	2	2	-	30	20	50		08	20
SEC	ITH41SEP201	Bootstrap	Practical	2		4	30	20	50		08	20
CEP	ITH41CEP201	Community Engagement Program	Practical	2		4	30	20	50		08	20
CC		Basket of CC From University	Practical	2		4	30	20	50		08	20
Total				**22**	**13**	**18**	**390**	**260**	**650**			**260**

Note:

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation,**Course Category: M**M-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

Third Year - Semester V

Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	ITH41MML301	Introduction to Data Science	Theory	2	2	-	30	20	50		08	20
MM	ITH41MML302	Python Programming	Theory	2	2	-	30	20	50		08	20
MM	ITH41MML303	Computer Networks	Theory	2	2		30	20	50		08	
MM	ITH41MMP301	Practical Based on Data Science	Practical	1	-	2	30	20	50		08	20
MM	ITH41MMP302	Practical Based on Python Programming	Practical	1	-	2	30	20	50		08	20
ME	ITH41MEL301	Java Script	Theory	3	3	-	60	40	100		16	40
	ITH41MEL302	Agile software development										
ME	ITH41MEP301	Practical based on Java Script	Practical	1	-	2	30	20	50		08	20
	ITH41MEP302	Agile software development										
MI		Basket of MI From University	Theory	3	3	-	60	40	100		16	40
MI		Basket of MI From University	Practical	1	-	2	30	20	50		08	20
VSC	ITH41VSP301	Mobile App Development	Practical	2	-	4	30	20	50		08	20
FP	ITH41FPJ301	Field Project	Project	2		4	30	20	50		08	20
Total				**20**	**13**	**10**	**390**	**260**	**650**			**280**

Note:

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation,**Course Category: M**M-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

Third Year - Semester VI

Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	ITH41MML304	Data Analytics	Theory	2	2	-	30	20	50		08	20
MM	ITH41MML305	Cloud Computing	Theory	2	2	-	30	20	50		08	20
MM	ITH41MML306	Drone Technology	Theory	2	2	-	30	20	50		08	20
MM	ITH41MMP303	Practical Based Data Analytic	Practical	1	-	2	30	20	50		08	20
MM	ITH41MMP304	Practical Based on Cloud Computing	Practical	1	-	2	30	20	50		08	20
ME	ITH41MEL303 ITH41MEL304	PHP UI/UX	Theory	3	3	-	60	40	100		16	40
ME	ITH41MEP303 ITH41MEP304	Practical based on PHP Practical based on UI/UX	Practical	1	-	2	30	20	50		08	20
MI		Basket of MI From University	Theory	3	3	-	60	40	100		16	40
MI		Basket of MI From University	Practical	1	-	2	30	20	50		08	20
OJT	ITH41JTP301	On Job Training	Practical	4		8	30	20	50		08	20
Total				**20**	**11**	**18**	**2**	**120**	**600**			

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation, **Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project.

Fourth Year - Semester VII

Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	ITH41MML401	Artificial Intelligence	Theory	3	3		60	40	100		16	40
MM	ITH41MML402	Internet of Things	Theory	3	3		60	40	100		16	40
MM	ITH41MML403	Network Security	Theory	3	3		60	40	100		16	40
MM	ITH41MMP401	Practical Based Artificial Intelligence	Practical	2		2	30	20	50		08	20
MM	ITH41MMP402	Practical Based on Internet of Things	Practical	2		2	30	20	50		08	20
MM	ITH41MMP403	Practical Based on Network Security	Practical	2		2	30	20	50		08	20
ME	ITH41MEL401 ITH41MEL402	Cloud Web Services Basics of Power BI	Theory	3			60	40	100		16	40
ME	ITH41MEP401 ITH41MEP402	Practical Based on Cloud Web Services Practical Based on Power BI	Practical	2		2	30	20	50		08	20
RM	ITH41RML401	Research Methodology	Theory	3		-	60	40	100		16	40
RM	ITH41RMP401	Practical based on Research Methodology	Practical	2		2	30	20	50		08	20
Total				**25**			**450**	**300**	**750**			

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation, **Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project.

Fourth Year - Semester VIII

Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	ITR41MML408	Big Data Analytics	Theory	3	3	-	60	40	100		16	40
MM	ITR 41MML409	Deep Learning	Theory	3	3	-	60	40	100		16	40
MM	ITR 41MMP408	Practical Based on s Big Data Analytics	Practical	1	-	2	30	20	50		08	20
MM	ITR 41MMP409	Practical Based on Deep Learning	Practical	1	-	2	30	20	50		08	20
ME	ITR 41MEL407	Geographical Information systems	Theory	3	3	-	60	40	100		16	40
	ITR 41MEL408	Multimodal Biometrics										
ME	ITR 41MEP407	Geographical Information systems	Practical	1	-	2	30	20	50		08	20
	ITR 41MEP408	Multimodal Biometrics										
RP	ITH 41RPJ402	Research Project	Practical	8		16	120	80	200		32	80
				20	14	16						
		Total										

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation, **Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project.

Four Year (Semester VII) Honours with Research

Fourth Year - Semester VIII

Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	ITH41MML407	Machine Learning	Theory	3	3	-	60	40	100		16	40
MM	ITH 41MML408	Natural Language Processing	Theory	3	3	-	60	40	100		16	40
MM	ITH 41MMP406	Practical Based on Machine Learning	Practical	1	-	2	30	20	50		08	20
MM	ITH 41MMP407	Practical Based on Natural Language Processing	Practical	1	-	2	30	20	50		08	20
ME	ITH 41MEL405	Remote Sensing	Theory	3	3	-	60	40	100		16	40
	ITH 41MEL406	Digital Image Processing	Theory									
ME	ITH 41MEP405	Practical based on Remote Sensing	Practical	1	-	2	30	20	50		08	20
	ITH 41MEP406	Practical based on Digital Image Processing	Practical									
RM	ITH41RML401	Research Methodology	Theory	3	3	-	60	40	100		16	40
RM	ITH41RMP401	Practical based on Research Methodology	Practical	1	-	2	30	20	50		08	20
RP	ITH 41RPJ401	Research Project	Practical	4	-	8	60	40	100		16	40
Total				**20**	**12**	**16**	**420**	**280**	**700**			**320**

Note:

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation,**Course Category: M**M-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

MGMUNIVERSITY

Fourth Year - Semester VIII

Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	ITR41MML408	Big Data Analytics	Theory	3	3	-	60	40	100		16	40
MM	ITR 41MML409	Deep Learning	Theory	3	3	-	60	40	100		16	40
MM	ITR 41MMP408	Practical Based on s Big Data Analytics	Practical	1	-	2	30	20	50		08	20
MM	ITR 41MMP409	Practical Based on Deep Learning	Practical	1	-	2	30	20	50		08	20
ME	ITR 41MEL407	Geographical Information systems	Theory	3	3	-	60	40	100		16	40
	ITR 41MEL408	Multimodal Biometrics	Theory									
ME	ITR 41MEP407	Geographical Information systems	Practical	1	-	2	30	20	50		08	20
	ITR 41MEP408	Multimodal Biometrics	Practical									
RP	ITH 41RPJ402	Research Project	Practical	8		16	120	80	200		32	80
			Total	**20**	**09**	**22**	**390**	**260**	**650**			

Note:

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation,**Course Category: M**M-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

Semester-I

Course code: ITH41MML101
Course name: Introduction to Information and Communication Technology
Course category: Major Mandatory   **Credits:** 2
Pre-requisites: Pre-university mathematics.

Course Objectives:
1. To understand basic topics and the current trends that are essential to the ICT industry.
2. To analysis the challenges & job opportunities in the Information Technology fraternity

Course Outcomes: At the end of the course, the students will be able to -
CO1: Understand the current trends, job opportunities and challenges of IT industries.
CO2: Identify the different elements of an information system, including input, output and processing elements.
CO3: Identify Digital Model: E-commerce & M-commerce
CO4: Recognize and distinguish the role of IT.

Contents

Unit	Content	Teaching hours
1	**Information Technology Basics -** What is ICT, ICT and IT, Functional Areas of an Organization, Applications of ICT Tools, Introduction Internet Telephony, Webcasting, Social Networking, and Computer Supported Cooperative Working (CSCW) New Model in Digital Economy: E-commerce, M-Commerce **Role of ICT in Organization** Role of ICT in Human Resource Management, Role of ICT in Finance and Account Management, Role of ICT in Marketing Management Role of ICT in Information System Management Role of ICT in Operations Management. Role of ICT in Business.	10
2	**Communications and Devices** – Computer architecture, Computer and its Characteristics Identify the different hardware components of a computer system, including CPU, RAM. Input/output devices and storage devices; Evaluate examples of software application**s.** Use of Software in ICT, New Communication Models: Internet, Intranet, extranet, Video-conferencing, Audio Conferencing	10
3	**Emerging Trends in Information Communication Technologies job opportunities in the fields. –** Machine Learning with advance Artificial Intelligence (AI), Quantum Computing (Supercomputing), Augmented Reality (AR) and Virtual Reality (VR),Global Internet of Things (IoT), Block chain technology, Data Science & Business Analytics, Deep Learning Drones Technology, Cloud computing Robotic Process Automation (RPA), Design Thinking.	10

Text Books: 1. Information Technology: Theory And Practice By Sinha, Pradeep K., Sinha, Priti
Reference Books: 1.Introduction to Information Technology By V.Rajaraman.
Online Resources: 1. NPTEL / SWAYAM lectures.

Syllabus
Semester-I

Course code: ITH41MMP101
Course name: Practical based on Introduction to Information and Communication Technology
Course category: Major Mandatory   **Credits:** 1

Pre-requisites: Pre-university mathematics.
Course Objectives:
1. Support functions: administrative, technical and supportive functions
2. New learning: new teaching and learning methods, techniques and tools

Course Outcomes: At the end of the course, the students will be able to -
CO1: Basic knowledge in hardware/software methods and tools for solving real-life and practical problems with an orientation to lifelong learning.
CO2: Identify Possess strong fundamental concepts in Information Communication Technology to address technological challenges
CO3: Learning the formatting skills on paragraphs, tables, lists, pages and awareness of new communication models.
CO4: An ability to use the techniques, skills, and modern engineering technology tools, standard processes necessary for practice as an IT professional.

Contents –

Unit	Content	Teaching hours
1	1. Computer Fundamental -Input Devices 2. Central processing Unit component 3. Output Devices 4. Computer Booting 5. Introduction to Binary Number System	10
2	6. Operating System Installation 7. M.S Word Introduction 8. Internet Browsing , 9. M.S. PowerPoint introduction 10. M.S. Excel introduction	10
3	11. New Communication Models 12. Video-conferencing, Audio Conferencing 13. Webcasting, 14. Social Networking **15.** E-commerce, M-Commerce	10

Text Books: 1. Information Technology: Theory And Practice By Sinha, Pradeep K., Sinha, Priti

2. Introduction to Information Technology By V.Rajaraman
Reference Books: 1.Introduction to Information Technology By V.Rajaraman.
2.. Information Technology: Theory And Practice By Sinha, Pradeep K., Sinha, Priti

Online Resources: 1. NPTEL / SWAYAM lectures.

Semester-I

Course code: ITH41MML102   **Course name:** Computer Architecture
Course category: Major Mandatory   **Credits:** 2
Pre-requisites: Pre-university mathematics.
Course Objectives:
1. Student understands of the basic structure and operation of a digital computer and various processors.
2. To analysis the challenges & job opportunities in the Information Technology fraternity
Course Outcomes: At the end of the course, the students will be able to -
CO1: Student understands of the basic structure and operation of a digital computer.
CO2: To learn the architecture and assembly language Programming of microprocessor
CO3: To study the different Processors.
Contents –

Unit	Content	Teaching hours
1	**Computer Arithmetic –** Number System: Decimal System Binary Number System, Hexadecimal Number System,Octal Number System,Number Conversion: Decimal to Other, Binary to Other, Octal to Other, Hexadecimal to Other, BCD Numbers, ASCII Code, Computer Arithmetic: Addition, Subtraction. **Logic Gates & Boolean Algebra-** Positive & Negative Logic, Truth Table Logic Gates: AND, OR, NOT, NAND, NOR and Exclusive-OR Gate, Universal Gates. Postulates & Theorems of Boolean Algebra (Idempotent, Complementation, Commutative, Associative,Distributive, De-Morgan's Theorem)	10
2	**Arithmetic Circuits –** Combinational Circuits, Implementing Combinational logic. Arithmetic Circuits: Half-Adder, Full-Adder, Half-Sub tractor, Full-Sub tractor. **Fundamentals of Microprocessors-** Comparison of 8-bit, 16-bitand 32-bitmicroprocessor.8086 Pin Configuration,8086 Internal Architectures,Execution Unit & Bus Interface,Flag Registers,Introduction to Addressing Modes	10
3	**8086 Interrupt and InterruptApplications-** Interrupts of 8086,Hardware Interrupts, Software Interrupts **Latest Trends in Microprocessor-** RISC and CISC Architectures, Design: Multicore Processor and Multicore Processing, Multicore Technology and Intel, Dual Core and Core Duo Processors, Corei3, i5, Mobile Processors.	10

Text Books:	1. Digital Electronics: Principles, Devices and Applications By Anil K. Maini
	2. MicroProcessors & Multi core systems By Lyla B Das
Reference Books:	1.Microprocessor and Interfacing By Douglas V Hall
	2.Digital Design By M. Morris Mano
Online Resources: 1. NPTEL / SWAYAM lectures.	

Semester-I

Course code: ITH41MMP102   **Course name:** Practical Based on Computer Architecture

Course category: Major Mandatory   **Credits:** 1

Pre-requisites: Pre-university mathematics.

Course Objectives:

1. Student understands of the basic structure and operation of a digital computer and various processors.
2. To analysis the challenges & job opportunities in the Information Technology fraternity

Course Outcomes: At the end of the course, the students will be able to -

CO1: Student understands of the basic structure and operation of a digital computer.

CO2: To learn the architecture and assembly language Programming of microprocessor

CO3: To study the different Processors.

Contents –

Unit	Content	Teaching hours
1	1. To Perform Number systems Conversations 2. To Perform Binary Arithmetic operations 3. To Verify the truth table of Basic Logic Gates 4. To Verify the truth table of Universal Logic Gates 5. To verify the truth table of Special Purpose Logic Gates.	10
2	6. State and Prove Demorgan's Theorem 7. To Study and Verify Combinational Logic Circuits (Half adder) 8. To Study and Verify Combinational Logic Circuits (Fulladder) 9. ToStudyGeneralPurposeRegistersof8086Microprocessor 10. To Study Special Purpose Registers of8086Microprocessor	10
3	11. To Study 8086 Pin Diagram and its Functioning 12. ToStudy8086 InterruptanditsApplications 13. ToStudyPentiumProArchitecture 14. ToAnalyzeandComparePentiumandCore-i3Processor 15. ToAnalyzeandCompareRISCandCiSCArchitecture	10

Text Books: 1. Digital Electronics: Principles, Devices and Applications By Anil K. Maini	
2. MicroProcessors & Multi core systems By Lyla B Das	
Reference Books: 1.Microprocessor and Interfacing By Douglas V Hall	
2.Digital Design By M. Morris Mano	
Online Resources: 1. NPTEL / SWAYAM lectures.	

Semester-I

Course code: ITH41VSP101   **Course name:** Practical Based on C Programming

Course category: Vocational skill course   **Credits:** 2

Pre-requisites: Pre-university mathematics.

Course Objectives:

1. Programming Paradigm help students to create properly designed programs.

2. Learning algorithms and practicing coding

3. Come up with varieties of solutions to a single problem

Course Outcomes: At the end of the course, the students will be able to -

CO1: Recognize and understand components of Computer System, Programming and most importantly summarize the advantages of structured programs

CO2: Describe the Modularization and basic structure of program.

CO3: Implements and Analyze the usage of flowcharts and pseudo code so as to become comfortable with logic development tools and understand their interrelationship
Determine and explore the workings of decision making, looping, and array manipulation.

CO4: Create Complex programs to build and process using significant amount of data and solve the real-life problem.

Contents –

Unit	Content	Teaching hours
1	1. Introduction to C, Syntax and basic structure of C program, Execution of C program 2. Get students familiar with different data types in C. 3. Get students familiar with different operators and expressions in C. 4. Understanding decision making using forms of IF statements 5. Programs to understand the concepts of loops in the programming.(For loop)	10
2	1. Programs to understand the concepts of loops in a program. (do and while loop) 2. Understanding decision making using forms of switch statements 3. Understanding decision making using forms of break, continue etc. statements 4. Perform different programs to understand the concept of Array. 5. To apply the knowledge of array to upgrade it on multidimensional array	10
3	1. Perform different programs to understand the concept of Array. 2. To apply the knowledge of array to upgrade it on multidimensional array (Project)	10

Text Books:	1. C Programing E. Balaguruswamy
	2. Programming in ANCI C
Reference Books:	1. Programming Language Design Concepts
	2. Programming Logic and Design
Online Resources: 1. NPTEL / SWAYAM lectures.	

Semester-I

Course code: ITH41SEL101   **Course name:** Programming logic and Design

Course category: Skill Enhancement course   **Credits:** 2

Pre-requisites: Pre-university mathematics.

Course Objectives:

1. Programming Paradigm help students to create properly designed programs.

2. Learning algorithms and practicing coding

3. Come up with varieties of solutions to a single problem

Course Outcomes: At the end of the course, the students will be able to -

CO1: Recognize and understand components of Computer System, Programming and most importantly summarize the advantages of structured programs

CO2: Describe the Modularization and basic structure of program.

CO3: Implements and Analyze the usage of flowcharts and pseudo code so as to become comfortable with logic development tools and understand their interrelationship

Determine and explore the workings of decision making, looping, and array manipulation.

Contents –

Unit	Content	Teaching hours
1	**An Overview of Computers and Programming-** Computer System, Programming Logic, Program Development Cycle, Pseudo code Statements & Flowchart, Programming and User Environments, Evolution of Programming Model. **Elements of High-Quality Programs-** Declaring and Using Variables and Constants, Operators: Performing Arithmetic Operations, Modularization: Modularizing a Program and its Advantages, Creating Hierarchy Charts, Features of Good Program Design **Understanding Structure-** The Disadvantages of Unstructured Spaghetti Code, Three Basic Structures - sequence, selection and loop, using a Priming Input to Structure a Program, Reasons for Structure, Recognizing Structure, Structuring and Modularizing Unstructured Logic.	10
2	**Making Decisions-** Boolean Expressions and the Selection Structure, Using Relational Comparison Operators, Understanding AND Logic, OR Logic & NOT Logic, Making Selections within Ranges, Precedence Combining AND & OR operators. **Looping-** Advantages of Looping, Loop Control Variable, Nested Loop, Avoiding Common Loop Mistakes, Using a '*for*' Loop, Common Loop Applications.	10
3	**Arrays-** Storing Data in Arrays, How an Array Can Replace Nested Decisions, Using Constants with Arrays Searching an Array for an Exact Match, Using Parallel Arrays, Searching an Array for a Range Match, Remaining within Array Bounds, Using a for Loop to Process an Array	10

Text Books:	1. C Programing E. Balaguruswamy
	2. Programming in ANCI C
Reference Books:	1. Programming Language Design Concepts By David A Watt
	2. Programming Logic and Design By Joyce Farrell
Online Resources:	1. NPTEL / SWAYAM lectures.

Semester-II

Course code ITH41MML103   **Course name:** Database Management System

Course category: Major Mandatory   **Credits:** 2

Pre-requisites: Pre-university mathematics.

Course Objectives:

1. Discuss Database management systems, databases and its applications
2. Familiarize the students with a good formal foundation on the relational model
3. Outline the various systematic database design approaches

Course Outcomes: At the end of the course, the students will be able to -

CO1: Identify the basic concepts and various data model used in database design ER modelling concepts and architecture use and design queries using SQL

CO2: Describe. Recognize and understand the basic concepts of database, knowledge, classifications of Architecture of database, database users, define advantages of the database

CO3: Draw E-R diagram, schema diagram, classify attributes, entity, entity set, relationship

CO4: Learn DDL, DML.DCL Commands, set operations

Contents –

Unit	Content	Teaching hours
1	**Introduction to basic concepts of DBMS-** Database System Application , Purpose of Database System, Database Architecture : 3-Level architecture Database Users & Administrators Responsibilities, Functional Components of Database system: Storage & Query Processor, Transaction Management	10
2	**Data Modeling & Design-** Type of Data Model Relation Data Model , E-R Data Model,Object Based Data Model, Semi-Structured Data Model Hierarchical & Network Data Model, E-R Data Model: Entity, Entity set, Entity types, Attributes, Types of Attributes, E-R diagram. Mapping Cardinalities , Data Association , Constraints : Integrity constraints I & II, Database Design : Overview of Design Process,Designing Phase, Normalization(1NF,2NF,3 NF)	10
3	**Relational Data Mode**l- Basic Structure, Database Schema, Integrity Rules, E.F.Codds Rules, Relational Algebra: Union , Intersection , Difference, Cartesian Product, Selection , Projection, Join : Natural, & Outer Join, Division, Trigger, Stored procedure with advantages and disadvantages	10

Text Books: 1. Database System concepts Korth, Siberschatz	
2. An Introduction to Database System B. Desai	
Reference Books: 1. Database System concepts Korth, Siberschatz	
2. An Introduction to Database System B. Desai	
Online Resources: 1. NPTEL / SWAYAM lectures.	

Semester-II

Course code ITH41MMP103 **Course name:** Practical Based on Database Management System	
Course category: Major Mandatory **Credits:** 1	

Course Objectives:

1. This course provides an introduction to relational database systems. The topics covered include the relational model,

2. SQL transactions, database design, and concepts and algorithms for building database management systems.

Course Outcomes: At the end of the course, the students will be able to -

CO1: Apply relational database theory and be able to describe relational algebra expression, tuple and domain relation expression from queries

CO2: Transform an information model into a relational database schema and to use a data definition language and/or utilities to implement the schema using a DBMS

CO3: Use an SQL interface of a multi-user relational DBMS package to create, secure, populate, maintain, and query a database.

CO4: Demonstrate a rudimentary understanding of programmatic interfaces to a database and be able to use the basic functions of one such interface.

Contents –

Unit	Content	Teaching hours
1	1. Design and draw E-R diagrams. 2. Study of DDL commands(create & Alter) 3. Study of DML commands (Insert, update & delete) & DCL commands (GRANT & REVOKE) with examples 4. Write & execute queries using select command using where, group by, order by and having clauses 5. Study of Single Row Functions with examples	10
2	6. Study of conversion functions with examples 7. Study of Join (natural, Inner) 8. Study of Join (outer, left & right) and Division Operations with examples 9. Study of Constraints primary key, foreign key, unique and check constraints on tables with Examples 10. Study of Basic Operations of Relational Algebra with examples (Union, Intersection)	10
3	11. Create emp table and dept table with appropriate field and apply table constraints 12. Create student table with appropriate fields and apply DDL and DML commands. 13. Use any table and do select operations using operators 14. Use any table and do select operations using clauses. 15. Use any tables and do select operations using aggregate functions	10

Text Books:	1. Database System concepts Korth, Siberschatz
	2. An Introduction to Database System B. Desai
Reference Books:	1. Database System concepts Korth, Siberschatz
	2. An Introduction to Database System B. Desai
Online Resources: 1. NPTEL / SWAYAM lectures.	

Semester-II

Course code ITH41MML104   **Course name:** Data Structure

Course category: Major Mandatory   **Credits:** 2

Course Objectives:

1. Apply the Knowledge of Data Structure to flexibly work with various types of data structure.
2. Implement various algorithms of Data Structures using their programming logics

Course Outcomes: At the end of the course, the students will be able to -

    CO1: Recognize and Understand basic terminologies of Data structure, classification, and most importantly summarize the advantages of Data structure with Arrays and its operations

    CO2: Describe the Modularization and basic structure of algorithms and programs of Linked list and Trees.

    CO3: Implements and Analyze the usage of Graph, Stack, Queues and Recursion.

    CO4: Determine and explore the workings of making, looping, and array manipulation and many more concepts of programming

    CO5: Create Complex programs to build and process using significant amount of data and solve the real-life problems with all the concept of data structure

Contents –

Unit	Content	Teaching hours
1	**Introduction to Data Structure –** Define data structure, classification and types of data structure, Data Organization and Data Structure, Basic Terminology: Data item, Fields, Records, Files, Entity, Attributes **Arrays-** Representation of Linear Arrays, Traversing, Insertion and Deletions Sorting & Searching Algorithms, Multidimensional Arrays: 2D & M-D Concept, Record: Record Structures, Representation in Memory	10
2	**Linked List-** Concept of Linked List, Representation of linked List in memory Traversing a linked list, Searching a linked list: sorted and unsorted, Insertion & Deletion in Linked List, Header Linked List & Two way List	10
3	**Stacks, Queues-** Stack: Operation, Array Representation of Stack, linked representation of stack, Arithmetic Expression POLISH & POSTFIX, Application of stacks: Quicksort, Queue: Representation of queues & link.Types of Queues: Deques & Priority Queue, Liner and non-liner DS	10

Text Books:	1. Fundamentals of Data structures Horowitz & Sahani
	2. An introduction to data structures and application Jean Paul Tremblay & Pal G. Sorenson
Reference Books:	1. Fundamentals of Data structures Horowitz & Sahani
	2. An introduction to data structures and application Jean Paul Tremblay & Pal G. Sorenson
Online Resources:	1. NPTEL / SWAYAM lectures.

Semester-II

Course code ITH41MMP104   **Course name:** Practical Based on Data Structure

Course category: Major Mandatory   **Credits:** 1

Pre-requisites: Pre-university mathematics.

Course Objectives:

1. Apply the Knowledge of Data Structure to flexibly work with various types of data structure

2. Implement various algorithms of Data Structures using their programming logics

Course Outcomes: At the end of the course, the students will be able to -

CO1: Recognize and Understand basic terminologies of Data structure, classification, and most importantly summarize the advantages of Data structure with Arrays and its operations

CO2: Describe the Modularization and basic structure of algorithms and programs of Linked list.

CO3: Implements and Analyze the usage of Graph, Stack, Queues and Recursion.

CO4:. Determine and explore the workings of making, looping, and array manipulation and many more concepts of programming

CO4: Create Complex programs to build and process using significant amount of data and solve the real-life problems with all the concept of data structure.

Contents –

Unit	Content	Teaching hours
1	1. Write a program using DIV (J, K) which reads a positive integer N>10 and determines whether or not N is a prime number. 2. Write a program which counts the number of particular character/word in the String. 3. Write a program which reads words WORD1 and WORD2 and then replaces each occurrence of word1 in text by word2 4. Implementation Traversing algorithm of Array: 5. Write the programs for traversing of n item using the array.	10
2	6. Implement linear search algorithm using C. 7. Implement binary search algorithm using C. 8. Implement Bubble sort algorithm using C. 9. Implementation traversing algorithm of Linked List: **10.** Write the programs for traversing of n item from the linked list	10
3	11. Implementation Insertion and Deletion algorithms of Stack: 12. Write the programs for push and pop operation using the stacks. 13. Implementation Insertion and Deletion algorithms of Queue: 14. Write the programs for insertion and deletion of n item from the queues. 15. Implementation Deletion algorithm of Array:	10

Text Books:	1. Fundamentals of Data structures Horowitz & Sahani
2. An introduction to data structures and application Jean Paul Tremblay & Pal G. Sorenson	
Reference Books:	1. Fundamentals of Data structures Horowitz & Sahani
2. An introduction to data structures and application Jean Paul Tremblay & Pal G. Sorenson	
Online Resources: 1. NPTEL / SWAYAM lectures.	

Semester-II

Course code ITH41VSP102	Course name: Web Fundamental
Course category: Vocational skill course	Credits: 2

Pre-requisites: Pre-university mathematics.

Course Objectives:

1. Describe HTML document structure and associated elements: doctype

2. Describe the purpose of, and use additional HTML tags

3. Explain how CSS allows for separation of display and document structure

4. Identify the main parts of a URL and describe the role of each: protocol, host, port, path, query parameter, fragment

Course Outcomes: At the end of the course, the students will be able to -

CO1: After completing this course, students will be able to create structure, organize, and publish a website using HTML and CSS.

CO2: Learning HTML & CSS is also an essential first step in learning how to code web pages professionally

CO3: Implements and Analyze the usage of Graph, Stack, Queues and Recursion.

CO4:. Students will work as Web Developers,Visual Designers, Front-End Web Developers in the IT field.

CO4: Students get more flexibility in their HTML & CSS training.

Contents –

Unit	Content	Teaching hours
1	1. Introduction to HTML. Create a basic HTML file 2. Create a static webpage using table tags of HTML 3. Create a static web page which defines all text formatting tags of HTML in tabular format 4. Create webpage using list tags of HTML 5. Create webpage to include image using HTML tag	10
2	6. Write a program to create a web page to print paragraphs in colors. 7. Create a form using the Element & Formatting tag. 8. Create a Form using Image Tag. 9. Create a Form using Image Tag. 10. Create employee registration webpage using HTML form objects	10
3	11. Create fream webpage using HTML form objects 12. Linking to a document in the same directory 13. Viewing the document source 14. Using the SSH File Transfer window to transfer files 15. Website creating using various tools	10

Text Books: 1. HTML & CSS By Jon Duckett
2. The complete reference HTML & CSS Thomas A. Powell
Reference Books: 1.HTML, CSS, and JavaScript All in One: Covering HTML5, CSS3, and ES6, Sams Teach Yourself By Julie C. Meloni and Jennifer Kyrin
Online Resources: 1. NPTEL / SWAYAM lectures.

Semester-II

Course code ITH41SEL102   **Course name:** Operating System

Course category: Skill Enhancement course   **Credits:** 2

Pre-requisites: Pre-university mathematics.

Course Objectives:

1. . Introduce modern operating systems basic concepts, policies, and mechanisms.

Course Outcomes: At the end of the course, the students will be able to -

CO1: Compare various process scheduling algorithms.

CO2: Describe the Apply the principles of concurrency.

CO3: Design deadlock, prevention and avoidance algorithms

CO4: Compare and contrast various memory management schemes.

CO4: Perform administrative tasks on Linux Servers/Windows O.S.

Contents –

Unit	Content	Teaching hours
1	**Introduction to Operating System-** Operating System Definition, OS as resource management, Structure of Operating System, Component of Computer System, Services provided by Operating System, Types of Operating System	10
2	**Processes and Threads –** Process concept: PCB, Process State, Operation on Process. Concurrency: Concurrentprocess, Threads, Multithreading Synchronization Deadlock **CPU Scheduling-** Time-slicing and the quantum, Preemptive and non-preemptive algorithms **Memory Management –** Main memory organization and management, Virutal memroy organization ,Paging and Segmentation, Virtual memory management algorithms and issues	10
3	**Linux System –** Basic Concepts; System Administration-Requirements for Linux System Administrator, Setting up a LINUX Multifunction Server, Domain Name System, Setting Up Local Network Services; **Virtualization-** Basic Concepts, Setting Up Xen, **VMware** on Linux Host and Adding Guest OS, **Docker:** Overview, Features, Components of Docker, Architecture.	10

Text Books: 1. Operating System Concepts A. Silberschatz ,By P.B. Galvin & G. Gagne	
2. Guide to Operating Systems By Greg Tomsho	
Reference Books:1.Operating System Concepts and Basic Linux Commands By Shital Ghate	
2. Docker: A Quick-start Beginner's Guide By Andy Hayes	
Online Resources: 1. NPTEL / SWAYAM lectures	