

GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SCHEME B.TECH. (2018 BATCH ONWARDS)

Third Semester											
S. No.	Course Category	Course Code	Course Title	Theory/ Practical	Hours per week			Internal Marks	External Marks	Total Marks	Credits
					L	T	P				
1.	Professional Core Courses	PCCS-101	Object Oriented Programming	Theory	3	0	0	40	60	100	3
2.	Professional Core Courses	PCCS-102	Computer Networks	Theory	3	0	0	40	60	100	3
3.	Engineering Science Courses	ESCS-101	Digital Electronics	Theory	3	0	0	40	60	100	3
4.	Basic Science Course	BSCS-101	Mathematics-III	Theory	3	1	0	40	60	100	4
5.	Humanities and Social Sciences including Management Courses	HSMCS-101	Human values and Professional Ethics	Theory	3	0	0	40	60	100	3
6.	Professional Core Courses	LPCCS-101	Object Oriented Programming Laboratory	Practical	0	0	4	30	20	50	2
7.	Professional Core Courses	LPCCS-102	Computer Networks Laboratory	Practical	0	0	2	30	20	50	1
8.	Engineering Science Courses	LESCS-101	Digital Electronics Laboratory	Practical	0	0	2	30	20	50	1
9.	Industrial/ Institutional Training*	TR-101	Training-I	Practical	0	0	0	60	40	100	1
10.	Seminar/Project	PRCS-101	Seminar and Technical Report Writing For Engineers	Practical	0	0	2	50	0	50	1
11.	Mentoring [#]		Mentoring and Professional Development	Practical	0	0	1	-	-	-	0
Total					15	1	10 + 1[#]	400	400	800	22

* 04 Weeks Institutional/Industrial training will be imparted at the end of 2nd semester. Students may go to Industry or in Institute. Evaluation of TR-101 will be held in the institute.

There will be one period per week for Mentoring and Professional Development; final evaluation of this course will be done based on the combined assessment of odd and even semester of respective year of study.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SCHEME B.TECH. (2018 BATCH ONWARDS)

Fourth Semester											
S. No.	Course Category	Course Code	Course Title	Theory/ Practical	Hours per week			Internal Marks	External Marks	Total Marks	Credits
					L	T	P				
1.	Professional Core Courses	PCCS-103	Discrete Mathematics	Theory	3	1	0	40	60	100	4
2.	Professional Core Courses	PCCS-104	Computer Architecture and Microprocessor	Theory	3	0	0	40	60	100	3
3.	Professional Core Courses	PCCS-105	Operating Systems	Theory	3	1	0	40	60	100	4
4.	Professional Core Courses	PCCS-106	Data Structures	Theory	3	0	0	40	60	100	3
5.	Professional Core Courses	PCCS-107	Software Engineering	Theory	3	1	0	40	60	100	4
6.	Professional Core Courses	LPCCS-103	Computer Architecture and Microprocessor Laboratory	Practical	0	0	2	30	20	50	1
7.	Professional Core Courses	LPCCS-104	Operating Systems Laboratory	Practical	0	0	2	30	20	50	1
8.	Professional Core Courses	LPCCS-105	Data Structures Laboratory	Practical	0	0	4	30	20	50	2
9.	Mandatory Courses**	MCCS-101	Environmental Sciences	Theory	2	0	0	50	0	50	0
10.	Mentoring [#]	MPD-102	Mentoring and Professional Development	Practical	0	0	1	100	0	100	1
Total					17	3	8 + 1[#]	440	360	800	23

#There will be one period per week for Mentoring and Professional Development; final evaluation of this course will be done based on the combined assessment of odd and even semester of respective year of study.

**The minimum criteria for passing Non Credit course is securing 40% marks in internal exams

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SCHEME B.TECH. (2018 BATCH ONWARDS)

Fifth Semester											
S. No.	Course Category	Course Code	Course Title	Theory/ Practical	Hours per week			Internal Marks	External Marks	Total Marks	Credits
					L	T	P				
1.	Professional Core Courses	PCCS-108	Artificial Intelligence	Theory	3	0	0	40	60	100	3
2.	Professional Core Courses	PCCS-109	Database Management Systems	Theory	3	0	0	40	60	100	3
3.	Professional Core Courses	PCCS-110	Formal Language and Automata Theory	Theory	3	1	0	40	60	100	4
4.	Professional Core Courses	PCCS-111	Design and Analysis of Algorithms	Theory	3	1	0	40	60	100	4
5.	Professional Elective Courses	PECS-XXX	Elective-I	Theory	3	0	0	40	60	100	3
6.	Professional Core Courses	LPCCS-106	Artificial Intelligence Laboratory	Practical	0	0	2	30	20	50	1
7.	Professional Core Courses	LPCCS-107	Database Management Systems Laboratory	Practical	0	0	2	30	20	50	1
8.	Professional Core Courses	LPCCS-108	Design and Analysis of Algorithms Laboratory	Practical	0	0	2	30	20	50	1
9.	Open Elective Mandatory Courses (Non-credit)***	MCI-102/ MCI-103	Constitution of India/ Organizational Behavior	Theory	2	0	0	50	0	50	0
10.	Industrial/ Institutional Training**	TR-102	Training-II	Practical	-	-	-	60	40	100	1
11.	Mentoring [#]		Mentoring and Professional Development	Practical	0	0	1	-	-	-	0
Total					17	2	6 +	400	400	800	21

**04 Weeks Institutional/Industrial training will be imparted at the end of 4th semester. Students may go to Industry or in Institute. Evaluation of TR-102 will be held in the institute.

[#]There will be one period per week for Mentoring and Professional Development; final evaluation of this course will be done based on the combined assessment of odd and even semester of respective year of study.

*** The students can be given the option to choose from a Non-credit open elective mandatory course. The minimum criteria for passing Non Credit course is securing 40% marks in internal exams.

Scheme B.Tech. (2018 batch onwards)

Sixth Semester											
S. No.	Course Category	Course Code	Course Title	Theory/ Practical	Hours per week			Internal Marks	External Marks	Total Marks	Credits
					L	T	P				
1.	Professional Core Courses	PCCS-112	Compiler Design	Theory	3	1	0	40	60	100	4
2.	Professional Core Courses	PCCS-113	Computer Graphics	Theory	3	1	0	40	60	100	4
3.	Professional Core Courses	PCCS-114	Machine Learning	Theory	3	0	0	40	60	100	3
4.	Professional Core Courses	PCCS-115	Cyber Security	Theory	3	0	0	40	60	100	3
5.	Professional Elective Courses	PECS-XXX	Elective-II	Theory	3	0	0	40	60	100	3
6.	Open Elective Courses	OECS-XXX	Open Elective-I	Theory	3	0	0	40	60	100	3
7.	Professional Core Courses	LPCCS-109	Computer Graphics Laboratory	Practical	0	0	2	30	20	50	1
8.	Professional Core Courses	LPCCS-110	Machine Learning Laboratory	Practical	0	0	2	30	20	50	1
9.	Professional Elective Courses	PECS-XXX	Elective-II Laboratory	Practical	0	0	2	30	20	50	1
10.	Project	PRCS-102	Minor Project	Practical	0	0	2	60	40	100	1
11.	Mentoring [#]	MPD-103	Mentoring and Professional Development	Practical	0	0	1	100	-	100	1
Total					18	2	8+1[#]	490	460	950	25

#There will be one period per week for Mentoring and Professional Development; final evaluation of this course will be done based on the combined assessment of odd and even semester of respective year of study.

After 6th Semester there are three types of choices for students:

Choice –I, Choice-II, Choice-III

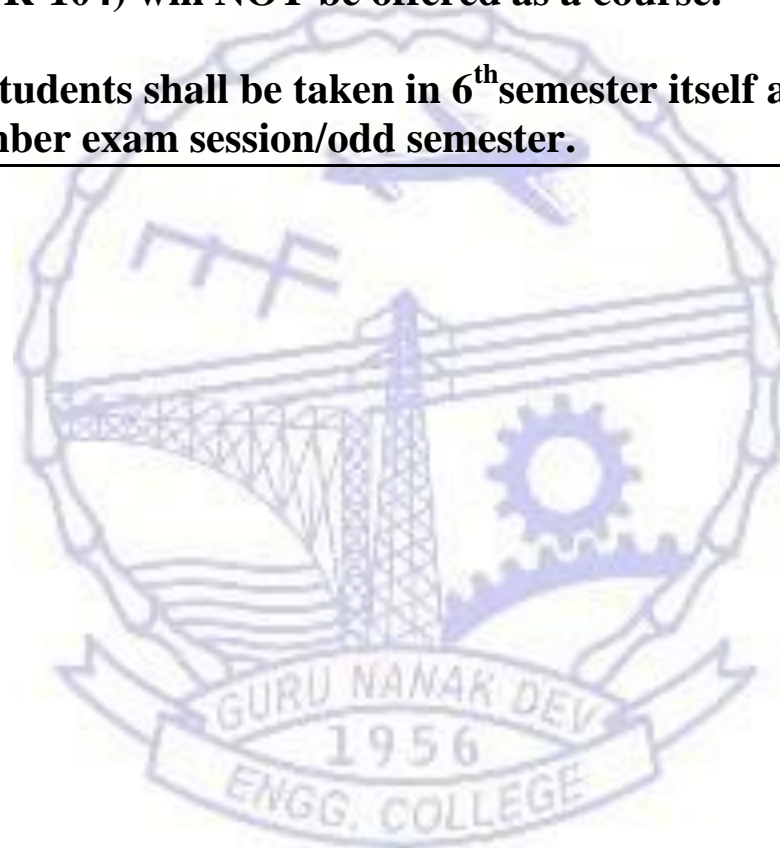
Industrial Training (TR-104) of 7th/8th semester will be choice based as under:

Choice-I: Industrial Training (TR-104) will be offered in 7th semester.

Choice-II: Industrial Training (TR-104) will be offered in 8th semester.

Choice-III: Industrial Training (TR-104) will NOT be offered as a course.

NOTE: Choices I/II/III from the students shall be taken in 6th semester itself after notification of regular/reappear results of November exam session/odd semester.



Scheme B.Tech. (2018 batch onwards)

CHOICE-I: Applicable to students opting for one semester Industrial Training (TR-104) in 7th Semester.

Seventh Semester								
S. No.	Course Category	Course Code	Course Title	Theory/ Practical	Internal Marks	External Marks	Total Marks	Credits
1.	Industrial/Institutional Training*	TR-103	Training-III*	---	60	40	100	1
2.	Industrial/Institutional Training	TR-104	Industrial Training	---	350	150	500	15
Total					410	190	600	16

*04 Weeks Institutional/Industrial training will be imparted at the end of 6th semester. Students may go to Industry or in Institute. Evaluation of **TR-103** will be held in the institute.

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Eighth Semester											
S. No.	Course Category	Course Code	Course Title	Theory/ Practical	Hours per week			Internal Marks	External Marks	Total Marks	Credits
					L	T	P				
1.	Professional Elective Courses	PECS-XXX	Elective-III	Theory	3	1	0	40	60	100	4
2.	Professional Elective Courses	PECS-XXX	Elective-IV	Theory	3	0	0	40	60	100	3
3.	Professional Elective Courses	LPECS-XXX	Elective-IV Laboratory	Practical	0	0	2	30	20	50	1
4.	Open Elective Courses	OECS-XXX	Open Elective- II	Theory	3	0	0	40	60	100	3
5.	Seminar/Project	PRCS-103	Major Project	Practical	0	0	6	120	80	200	3
6.	Seminar/Project*	PRCS-106/ PRCS-107	Technical Aptitude/ Software Management Tools	Practical	0	0	2	50	0	50	1
7.	Mentoring#	MPD-104	Mentoring and Professional Development	Practical	0	0	1	100	-	100	1
Total					9	1	10+1[#]	420	280	700	16

#There will be one period per week for Mentoring and Professional Development; final evaluation of this course will be done based on the combined assessment of odd and even semester of respective year of study.

*The students who have opted Choice-I, can choose either PRCS-106 or PRCS-107.

List of Professional Elective Courses for CHOICE-I

TRACK 1: Software Engineering

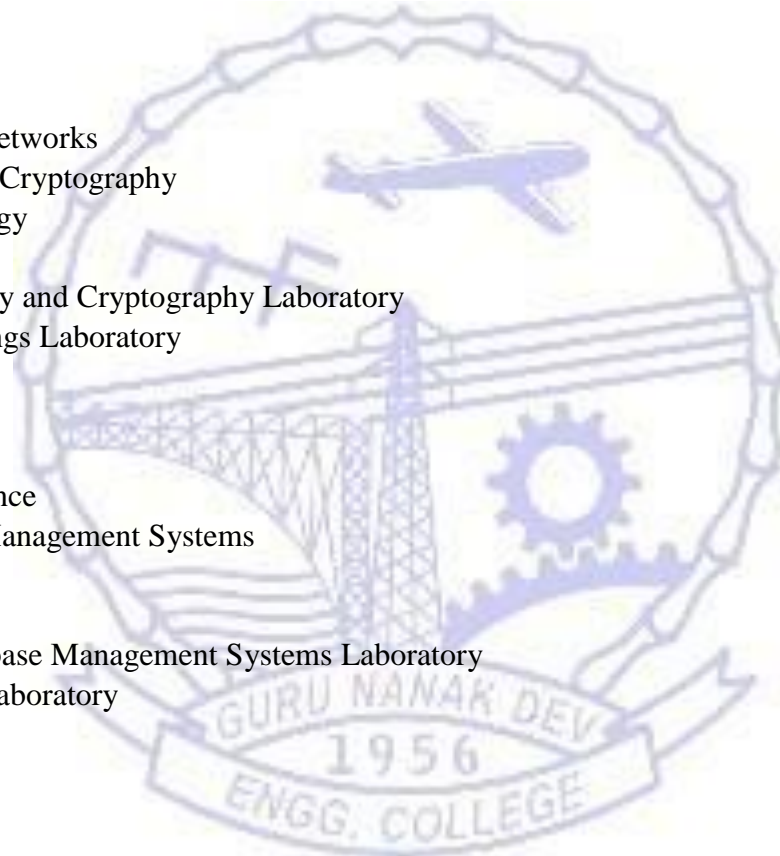
1. Elective-I: PECS-101 Software Project Management
2. Elective-II: PECS-102 Software Testing and Quality Assurance
3. Elective-III: PECS-105 Software Metrics
4. Elective-IV: PECS-107 Component Based Development
5. Elective-II Lab: LPECS-101 Software Testing and Quality Assurance Laboratory
6. Elective-IV Lab: LPECS-103 Component Based Development Laboratory

TRACK 2: Network Technologies

1. Elective-I: PECS-106 Advanced Computer Networks
2. Elective-II: PECS-108 Network Security and Cryptography
3. Elective-III: PECS-113 Blockchain Technology
4. Elective-IV: PECS-112 Internet of Things
5. Elective-II Lab: LPECS-104 Network Security and Cryptography Laboratory
6. Elective-IV Lab: LPECS-106 Internet of Things Laboratory

TRACK 3: Data Management

1. Elective-I: PECS-111 Statistics for Data Science
2. Elective-II: PECS-114 Advanced Database Management Systems
3. Elective-III: PECS-118 Big Data
4. Elective-IV: PECS-119 Data Science
5. Elective-II Lab: LPECS-107 Advanced Database Management Systems Laboratory
6. Elective-IV Lab: LPECS-109 Data Science Laboratory



TRACK 4: Machine Intelligence

1. Elective-I: PECS-116 Information Retrieval
2. Elective-II: PECS-120 Natural Language Processing
3. Elective-III: PECS-123 Human Computer Interaction
4. Elective-IV: PECS-124 Deep Learning
5. Elective-II Lab: LPECS-110 Natural Language Processing Laboratory
6. Elective-IV Lab: LPECS-112 Deep Learning Laboratory

TRACK 5: Algorithm Design and Programming

1. Elective-I: PECS-125 System Programming
2. Elective-II: PECS-126 Java Programming
3. Elective-III: PECS-129 Parallel and Distributed Algorithms
4. Elective-IV: PECS-130 Mobile Application Development
5. Elective-II Lab: LPECS-113 Java Programming Laboratory
6. Elective-IV Lab: LPECS-115 Mobile Application Development Laboratory



Scheme B.Tech. (2018 batch onwards)

CHOICE-II: Applicable to students opting for one semester Industrial Training (TR-104) in 8th Semester.

Seventh Semester

S. No.	Course Category	Course Code	Course Title	Theory/ Practical	Hours per week			Internal Marks	External Marks	Total Marks	Credits
					L	T	P				
1.	Professional Elective Courses	PECS-XXX	Elective-III	Theory	3	1	0	40	60	100	4
2.	Professional Elective Courses	PECS-XXX	Elective-IV	Theory	3	0	0	40	60	100	3
3.	Professional Elective Courses	PECS- XXX	Elective-IV Laboratory	Practical	0	0	2	30	20	50	1
4.	Open Elective Courses	OECS-XXX	Open Elective-II	Theory	3	0	0	40	60	100	3
5.	Seminar/Project	PRCS-103	Major Project	Practical	0	0	6	120	80	200	3
6.	Seminar/Project*	PRCS-106/ PRCS-107	Technical Aptitude/ Software Management Tools	Practical	0	0	2	50	0	50	1
7.	Industrial/Institutional Training*	TR-103	Training-III*	Practical	-	-	-	60	40	100	1
8.	Mentoring #	MPD-104	Mentoring and Professional Development	Practical	0	0	1	-	-	-	0
Total					9	1	10+1[#]	380	320	700	16

*04 Weeks Institutional/Industrial training will be imparted at the end of 6th semester. Students may go to Industry or in Institute. Evaluation of **TR-103** will be held in the institute.

*The students who have opted Choice-II, can opt PRCS-106 or PRCS-107

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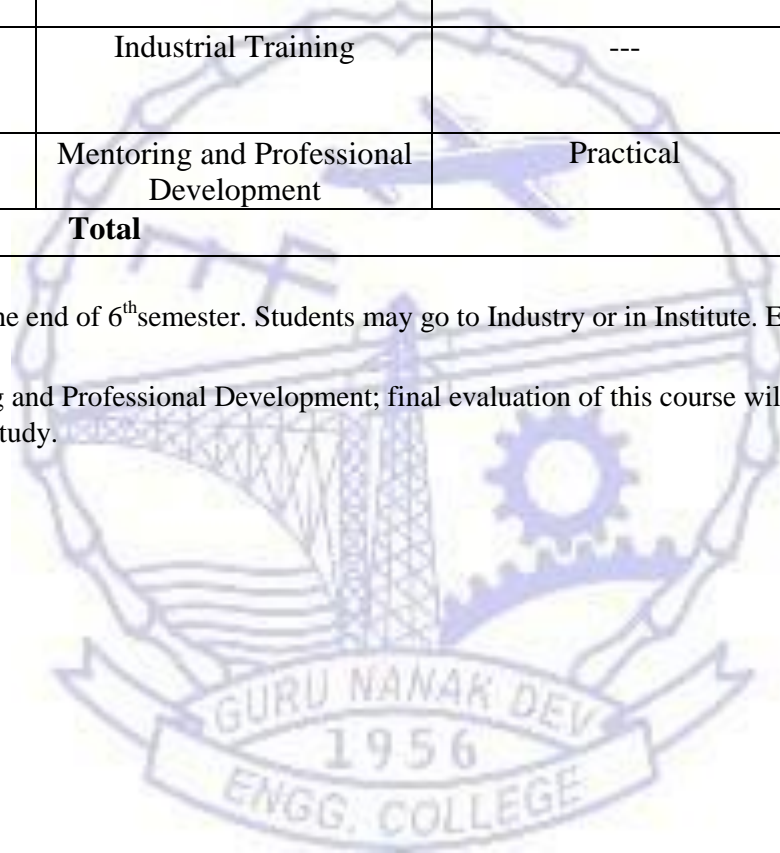
There will be one period per week for Mentoring and Professional Development; final evaluation of this course will be done based on the combined assessment of odd and even semester of respective year of study.

Eighth Semester

S. No.	Course Category	Course Code	Course Title	Theory/ Practical	Internal Marks	External Marks	Total Marks	Credits
1.	Industrial/ Institutional Training*	TR-104	Industrial Training	---	350	150	500	15
2.	Mentoring #	MPD-104	Mentoring and Professional Development	Practical	100	0	100	1
Total					450	150	600	16

*Institutional/Industrial training will be imparted at the end of 6th semester. Students may go to Industry or in Institute. Evaluation of 4 weeks Training-III held after 6th semester in the institute.

There will be one period per week for Mentoring and Professional Development; final evaluation of this course will be done based on the combined assessment of odd and even semester of respective year of study.



List of Professional Elective Courses for CHOICE-II

TRACK 1: Software Engineering

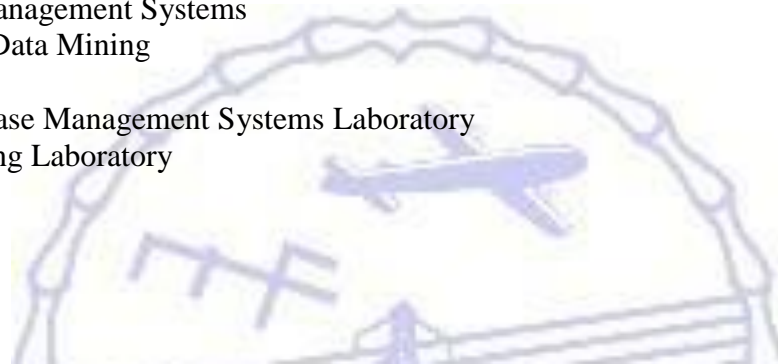
1. Elective-I: PECS-101 Software Project Management
2. Elective-II: PECS-102 Software Testing and Quality Assurance
3. Elective-III: PECS-103 Agile Software Development
4. Elective-IV: PECS-104 Object Oriented Design using UML
5. Elective-II Lab: LPECS-101 Software Testing and Quality Assurance Laboratory
6. Elective-IV Lab: LPECS-102 Object Oriented Design using UML Laboratory

TRACK 2: Network Technologies

1. Elective-I: PECS-106 Advanced Computer Networks
2. Elective-II: PECS-108 Network Security and Cryptography
3. Elective-III: PECS-109 Software Defined Networks
4. Elective-IV: PECS-110 Wireless Sensor Networks
5. Elective-II Lab: LPECS-104 Network Security and Cryptography Laboratory
6. Elective-IV Lab: LPECS-105 Wireless Sensor Networks Laboratory

TRACK 3: Data Management

1. Elective-I: PECS-111 Statistics for Data Science
2. Elective-II: PECS-114 Advanced Database Management Systems
3. Elective-III: PECS-115 Data Warehouse and Data Mining
4. Elective-IV: PECS-117 Cloud Computing
5. Elective-II Lab: LPECS-107 Advanced Database Management Systems Laboratory
6. Elective-IV Lab: LPECS-108 Cloud Computing Laboratory



TRACK 4: Machine Intelligence

1. Elective-I: PECS-116 Information Retrieval
2. Elective-II: PECS-120 Natural Language Processing
3. Elective-III: PECS-121 Computer Vision
4. Elective-IV: PECS-122 Soft Computing
5. Elective-II Lab: LPECS-110 Natural Language Processing Laboratory
6. Elective-IV Lab: LPECS-111 Soft Computing Laboratory

TRACK 5: Algorithm Design and Programming

1. Elective-I: PECS-125 System Programming
2. Elective-II: PECS-126 Java Programming
3. Elective-III: PECS-127 Advanced Algorithm Design and Analysis
4. Elective-III: PECS-132 Design and Analysis of Advanced Algorithms
5. Elective-IV: PECS-128 Web Technologies
6. Elective-II Lab: LPECS-113 Java Programming Laboratory
7. Elective-IV Lab: LPECS-114 Web Technologies Laboratory

CHOICE-III: Applicable to students not opting for one semester Industrial Training (TR-104).

Seventh Semester											
S. No.	Course Category	Course Code	Course Title	Theory/ Practical	Hours per week			Internal Marks	External Marks	Total Marks	Credits
					L	T	P				
1	Professional Elective Courses	PECS-XXX	Elective-III	Theory	3	1	0	40	60	100	4
2	Professional Elective Courses	PECS-XXX	Elective-IV	Theory	3	0	0	40	60	100	3
3	Professional Elective Courses	LPECS- XXX	Elective-IV Laboratory	Practical	0	0	2	30	20	50	1
4	Open Elective Courses	OECS- XXX	Open Elective-II	Theory	3	0	0	40	60	100	3
5	Seminar/Project	PRCS-104	Major Project	Practical	0	0	6	120	80	200	3
6	Seminar/Project Elective	PRCS-106	Technical Aptitude	Practical	0	0	2	50	0	50	1
7	Training*	TR-103	Training-III*	Practical	-	-	-	60	40	100	1
8	Mentoring #	MPD-104	Mentoring and Professional Development	Practical	0	0	1	-	-	-	0
Total					9	1	10+1[#]	380	320	700	16

*Evaluation of 4 weeks industrial/institutional training held after 6th semester.

[#]There will be one period per week for Mentoring and Professional Development; final evaluation of this course will be done based on the combined assessment of odd and even semester of respective year of study.

Scheme B.Tech. (2018 batch onwards)

Eighth Semester											
S. No.	Course Category	Course Code	Course Title	Theory/ Practical	Hours per week			Internal Marks	External Marks	Total Marks	Credits
					L	T	P				
1.	Professional Elective Courses	PECS-XXX	Elective-III	Theory	3	1	0	40	60	100	4
2.	Professional Elective Courses	PECS-XXX	Elective-IV	Theory	3	0	0	40	60	100	3
3.	Professional Elective Courses	LPECS-XXX	Elective-IV Laboratory	Practical	0	0	2	30	20	50	1
4.	Open Elective Courses	OECS- XXX	Open Elective-III	Theory	3	0	0	40	60	100	3
5.	Seminar/Project	PRCS-105	Major Project	Practical	0	0	6	120	80	200	3
6.	Seminar/Project Elective	PRCS-107	Software Management Tools	Practical	0	0	2	50	0	50	1
7.	Mentoring #	MPD-104	Mentoring and Professional Development	Practical	0	0	1	100	-	100	
Total					9	1	10+1[#]	420	280	700	16

[#]There will be one period per week for Mentoring and Professional Development; final evaluation of this course will be done based on the combined assessment of odd and even semester of respective year of study.

Professional Elective Courses for CHOICE-III

TRACK 1: Software Engineering

1. Elective-I: PECS-101 Software Project Management
2. Elective-II: PECS-102 Software Testing and Quality Assurance
3. Elective-III: PECS-103 Agile Software Development
4. Elective-IV: PECS-104 Object Oriented Design using UML
5. Elective-V: PECS-105 Software Metrics
6. Elective-VI: PECS-107 Component Based Development
7. Elective-II Lab: LPECS-101 Software Testing and Quality Assurance Laboratory
8. Elective-IV Lab: LPECS-102 Object Oriented Design using UML Laboratory
9. Elective-VI Lab: LPECS-103 Component Based Development Laboratory

TRACK 2: Network Technologies

1. Elective-I: PECS-106 Advanced Computer Networks
2. Elective-II: PECS-108 Network Security and Cryptography
3. Elective-III: PECS-109 Software Defined Networks
4. Elective-IV: PECS-110 Wireless Sensor Networks
5. Elective-V: PECS-113 Blockchain Technology
6. Elective-VI: PECS-112 Internet of Things
7. Elective-II Lab: LPECS-104 Network Security and Cryptography Laboratory
8. Elective-IV Lab: LPECS-105 Wireless Sensor Networks Laboratory
9. Elective-VI Lab: LPECS-106 Internet of Things Laboratory



TRACK 3: Data Management

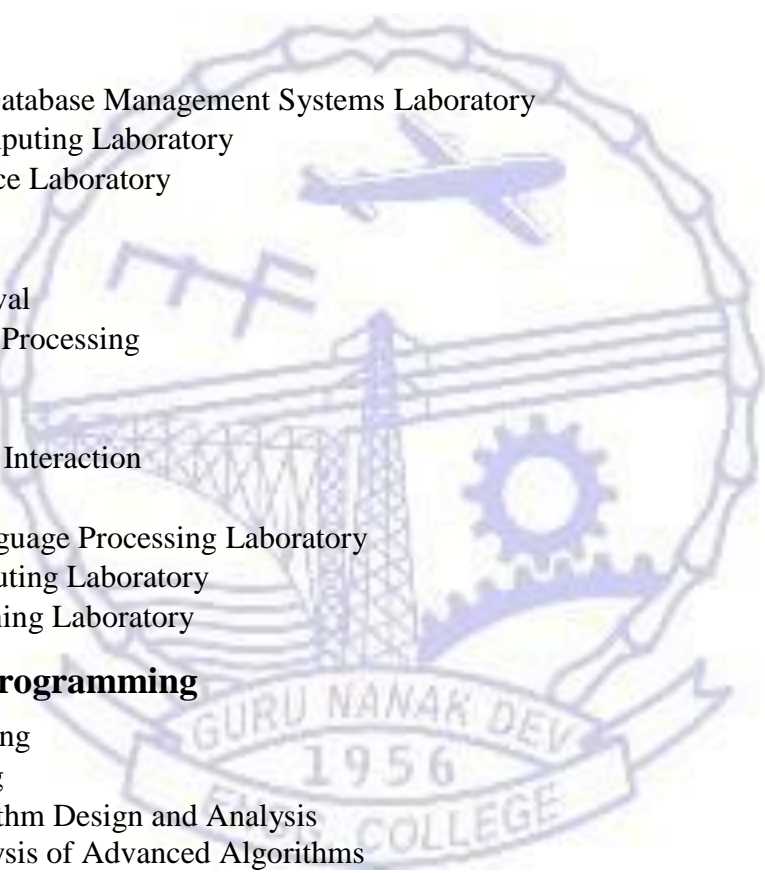
1. Elective-I: PECS-111 Statistics for Data Science
2. Elective-II: PECS-114 Advanced Database Management Systems
3. Elective-III: PECS-115 Data Warehouse and Data Mining
4. Elective-IV: PECS-117 Cloud Computing
5. Elective-V: PECS-118 Big Data
6. Elective-VI: PECS-119 Data Science
7. Elective-II Lab: LPECS-107 Advanced Database Management Systems Laboratory
8. Elective-IV Lab: LPECS-108 Cloud Computing Laboratory
9. Elective-VI Lab: LPECS-109 Data Science Laboratory

TRACK 4: Machine Intelligence

1. Elective-I: PECS-116 Information Retrieval
2. Elective-II: PECS-120 Natural Language Processing
3. Elective-III: PECS-121 Computer Vision
4. Elective-IV: PECS-122 Soft Computing
5. Elective-V: PECS-123 Human Computer Interaction
6. Elective-VI : PECS-124 Deep Learning
7. Elective-II Lab: LPECS-110 Natural Language Processing Laboratory
8. Elective-IV Lab: LPECS-111 Soft Computing Laboratory
9. Elective-VI Lab: LPECS-112 Deep Learning Laboratory

TRACK 5: Algorithm Design and Programming

1. Elective-I: PECS-125 System Programming
2. Elective-II: PECS-126 Java Programming
3. Elective-III: PECS-127 Advanced Algorithm Design and Analysis
4. Elective-III: PECS-132 Design and Analysis of Advanced Algorithms
5. Elective-IV: PECS-128 Web Technologies
6. Elective-V: PECS-129 Parallel and Distributed Algorithms
7. Elective-VI: PECS-130 Mobile Application Development
8. Elective-II Lab: LPECS-113 Java Programming Laboratory
9. Elective-IV Lab: LPECS-114 Web Technologies Laboratory



List of Open Electives courses to be offered to other Departments:

Open Elective – I:

1. OECS-101: Software Project Management
2. OECS-102: Object Oriented Programming using Java
3. OECS-103: Cyber Laws and Ethics
4. OECS-104: Data Structures
5. OECS-113: Cloud Computing-I

Open Elective – II:

1. OECS-105: Simulation and Modeling
2. OECS-106: Business Information System
3. OECS-107: Artificial Intelligence
4. OECS-108: Soft Computing
5. OECS-114 Cloud Computing-II

Open Elective – III:

1. OECS-109: Cyber Security
2. OECS-110: Real Time Systems
3. OECS-111: Multimedia Systems
4. OECS-112: Web Technologies
5. OECS-115: Ethical Hacking

