Agnel Charities'

Fr. C. Rodrigues Institute of Technology

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An Autonomous Institute Affiliated to the University of Mumbai

Handbook Containing Rules, Regulations, Curriculum & Examination Schemes for

Honours / Minor / Honours in Research Degree Programs in B. Tech

Approved By: Academic Council of Fr.C.Rodrigues Institute of Technology

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A. Abbreviations

HMCC	Honours or Minor Core Course
HML	Honours or Minor Laboratory
HMMP	Honours or Minor Mini Project
RP	Research Project
RPC	Research Project Coursework

Introduction

In the AICTE's Approval Process Handbook-2020-21, there's a strong emphasis on incorporating Elective Courses in Emerging Areas across all branches of Engineering andTechnology. Consequently, the University of Mumbai launched Honours and Minor Degree Programs in Engineering during the Academic Year 2022-23.

Agnel Charities' Fr.C. Rodrigues Institute of Technology (FCRIT) has chosen to continue offering these Honours and Minor degrees autonomously, recognizing their potential to equip students with specialized knowledge or research in emerging fields of interest. This initiative is geared towards enhancing students' proficiency in these areas and empowering them with valuable skills.

RHM 2401.1 Proposed Honours, Minor, and Honours in Research Degree Programs at FCRIT

Students shall have the flexibility to pursue one of three designations: (i) B. Tech with an Honours Degree, (ii) B. Tech with a Minor Degree, or (iii) B. Tech with Honours in Research Degree.

Students who fulfil the eligibility criteria outlined RHM 2401.3 of this handbook have the option to pursue an additional 18 credits from the fifth to eighth semesters. This enables them to attain a B. Tech degree with either Honours, Minor, or Honours in Research designation.

For the B. Tech Degree in Honours, students are required to choose additional courses within a similar technology discipline.

For the B. Tech Degree in Minor, students are required to choose additional courses in a different technology discipline.

For B. Tech Degree in Honours with Research, students need to engage in a research project, either from reputable research organizations like IIT, TIFR, etc. or in exceptional cases at FCRIT depending upon available infrastructure and domain expertize of the guide, in the similar technology discipline.

- Proposed Honours and Minor Degree specializations
    a) Artificial Intelligence & Machine Learning
    b) Blockchain

c) Augmented Reality/Virtual Reality
d) Data Science
e) Cyber Security
f) IoT & Embedded Systems
g) Network Security
h) Data Analytics & AI
i) Additive Manufacturing
j) Supply Chain
k) Aeronautical Engineering
l) VLSI
m) Electric Vehicle
n) Renewable Energy
o) Power Electronics and Drives

RHM 2401.2 Mapping as 'Honours' or 'Minor' Degree Program with Existing B. Tech Programs

Please refer to Table RHM 2401.2.1 for the mapping of a particular specialization either as an Honours or as a Minor degree with existing B. Tech programs.

Table RHM 2401.2.1: Mapping as 'Honours' or 'Minor' Degree Program with Existing B. TechPrograms

Honours/Minor Specialization	B. Tech Programs that can offer this as an Honours Degree	B. Tech Programs that can offerthis as a Minor Degree
Artificial Intelligence & Machine Learning	1. Computer Engineering 2. Electronics & Telecommunication Engineering 3. Information Technology	1. Mechanical Engineering 2. Electrical Engineering
Blockchain		
Augmented Reality/Virtual Reality		
Data Science		
Cyber Security		
IoT & Embedded Systems		
Network Security		
Data Analytics and AI	Mechanical Engineering	1. Computer Engineering 2. Electronics & Telecommunication Engineering 3. Electrical Engineering 4. Information Technology
Additive Manufacturing		
Supply Chain		
Aeronautical Engineering		
VLSI	Electronics & Telecommunication Engineering	1. Computer Engineering 2. Mechanical Engineering 3. Electrical Engineering 4. Information Technology

Electric Vehicle	1. Electrical Engineering 2. Mechanical Engineering	1. Computer Engineering 2. Electronics & Telecommunication Engineering 3. Information Technology
Renewable Energy	Electrical Engineering	1. Computer Engineering 2. Mechanical Engineering 3. Electronics & Telecommunication Engineering 4. Information Technology
Power Electronics and Drives		

RHM 2401.3 Eligibility Criteria for Honours, Minor, and Honours in Research Degree Programs for Students

a) At the end of semester IV students shall not have any live backlog for any of the courses in semesters I to IV.
b) Students must achieve a CGPI of 7.5 or higher based on semesters I to IV results.
c) Direct Second Year (DSE) admitted students shall not have any live backlog at the end of semester IV for any of the courses in semesters III to IV and must achieve a CGPI of 7.5 or higher based on semesters III and IV results.
d) Each eligible student may choose to pursue either one Honours or one Minor or Honours in Research Program and accordingly shall do course registration from semester V to VIII.
e) Participation in Honours/Minor/Honours in Research Degree programs is voluntary.
f) Honours/Minor/Honours in Research degree programs are only available during regular engineering studies.
g) Completion of the Honours/Minor/Honours in Research degree program must be accomplished within four semesters as stipulated.

RHM 2401.4 Honours/Minor Degree Programs Scheme and Structure

Credit courses for Honours, Minor, and Honours in Research programs will be available from Semester V through Semester VIII. The curriculum structure and examination scheme for B. Tech with Honours and Minor are detailed in Table RHM 2401.4.1 and RHM 2401.4.2, respectively. For the Honours/Minor/Honours in Research specialized courses grades will be awarded. However, the marks will not be included in CGPI calculations.

Table RHM 2401.4.1: Curriculum Structure for Honours/Minor Degree Program

Course Type	Sem	Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
				L	P	T	L	P	T	Total
HMCC	V	HMCCXX501	Honours/Minor Core Course-I	3	--	--	3	--	--	3
HMCC	VI	HMCCXX602	Honours/Minor Core Course -II	3	--	--	3	--	--	3
HMCC	VII	HMCCXX703	Honours/Minor Core Course -III	4	--	--	4	--	--	4
HML	VII	HMLXX701	Honours/Minor Laboratory-I	--	4	--	--	2	--	2
HMCC	VIII	HMCCXX804	Honours/Minor Core Course -IV	4	--	--	4	--	--	4
HMMP	VIII	HMMPXX801	Honours/Minor Mini Project	--	6	--	--	2	--	2
			Total	14	10	--	14	04	--	18

Table RHM 2401.4.2: Examination Scheme for Honours/Minor Degree Program

				Examination Scheme					
Course Type	Sem	Course Code	Course Name	In-Semester Assessment		End Sem Exam (ESE)	Exam. Duration for Theory (in Hrs)		Total
				Continuous Assessment	Mid Sem Exam		Mid Sem	End Sem	
HMCC	V	HMCCXX501	Honours/Minor Core Course-I	20	30	50	1.5	2	100
HMCC	VI	HMCCXX602	Honours/Minor Core Course -II	20	30	50	1.5	2	100
HMCC	VII	HMCCXX703	Honours/Minor Core Course -III	20	30	50	1.5	2	100
HML	VII	HMLXX701	Honours/Minor Lab-I	50	--	--	--	--	50
HMCC	VIII	HMCCXX804	Honours/Minor Core Course -IV	20	30	50	1.5	2	100
HMMP	VIII	HMMPXX801	Honours/Minor Mini Project	50	--	50	--	--	100
			Total	180	120	250	--	--	550

RHM 2401.5 Course Details for the Honours/Minor Degree Programs

Table RHM2401.5.1 gives course details for each of the Honours/Minor Degree Programs specializations offered at FCRIT.

Table RHM 2401.5.1: Course Details for Honours/Minors Degree Programs

Honours/ Minor Degree Programs	Semester V	Semester VI	Semester VII		Semester VIII	
	Theory Course	Theory Course	Theory Course	Lab Course	Theory Course	Mini Project
	HMC-I	HMC-II	HMC-III	HML-I	HMC-IV	HMMP
Artificial Intelligence & Machine Learning	HMCAL501	HMCAL602	HMCAL703	HMLAL701	HMCAL804	HMMPAL801
	Knowledge Engineering	Foundation of Machine Learning	Deep Learning	Artificial Intelligence & Machine Learning Laboratory	Advanced AI	Mini Project
Blockchain	HMCBC501	HMCBC602	HMCBC703	HMLBC701	HMCBC804	HMMPBC801
	Introduction to Blockchain & Cryptocurrency	Blockchain Platforms	Blockchain Development	Blockchain Laboratory	Decentralised Applications	Mini Project
Augmented Reality/ Virtual Reality	HMCAV501	HMCAV602	HMCAV703	HMLAV701	HMCAV804	HMMPAV801
	Virtual Reality	Augmented Reality & Mix Reality	Augmented Reality/ Virtual Reality Applications	Augmented Reality/ Virtual Reality Laboratory	Game Development with Virtual Reality	Mini Project
Data Science	HMCDS501	HMCDS602	HMCDS703	HMLDS701	HMCDS804	HMMPDS801
	Foundation of Data Science	Data Science for Healthcare	Social Media Analytics	Data Analytics Laboratory	Marketing & Financial Analytics	Mini Project
Cyber Security	HMCCS501	HMCCS602	HMCCS703	HMLCS701	HMCCS804	HMMPCS801
	Cybercrime & Cyber Security	Infrastructure Security	Security Audit & Risk Assessment	Cyber Security Laboratory	Application Security	Mini Project
IoT & Embedded Systems	HMCIE501	HMCIE602	HMCIE703	HMLIE701	HMCIE804	HMMPIE801
	Sensors & IoT Protocols	Embedded System Design with RTOS	Dynamic paradigms of IoT	IoTES Laboratory	AIoT & Industry 5.0	Mini Project
Network Security	HMCNS501	HMCNS602	HMCNS703	HMLNS701	HMCNS804	HMMPNS801
	Introduction to Communication Networks	Computer Networks & Security	Encryption Algorithms for Networks	NS Laboratory	Advanced Topics in Network Security	Mini Project
Data Analytics and AI	HMCDA501	HMCDA602	HMCDA703	HMLDA701	HMCDA804	HMMPDA801
	Artificial Intelligence and Machine Learning	Foundations of Data Science	Industrial Analytics	Machine Learning Laboratory	Deep Learning	Mini Project
	HMCAM501	HMCAM602	HMCAM703	HMLAM701	HMCAM804	HMMPAM801

Additive Manufacturing	CAD/CAM & Bio Modelling	CAE & Optimization	3D Printing Technologies I	Digital Manufacturing Laboratory	3D Printing Technologies II	Mini Project
Supply Chain	HMCSC501	HMCSC602	HMCSC703	HMLSC701	HMCSC804	HMMPSC801
	Fundamentals of Logistics Management	Operations and Supply Chain Management	Project Management in Supply Chain	Logistics Supply Chain Management Laboratory	Quality Management in Supply Chain	Mini Project
Aeronautical Engineering	HMCAN501	HMCAN602	HMCAN703	HMLAN701	HMCAN804	HMMPAN801
	Basics of Aeronautical Engineering	Low speed aerodynamics and Flight Dynamics	Computational Fluid Dynamics	Computational Fluid Dynamics Laboratory	Aircraft Structural Design & Analysis	Mini Project
VLSI	HMCVL501	HMCVL602	HMCVL703	HMLVL701	HMCVL804	HMMPVL801
	CMOS VLSI	System Architecture	ASIC Design	VLSI Laboratory	System on Chip Design	Mini Project
Electric Vehicle	HMCEV501	HMCEV602	HMCEV703	HMLEV701	HMCEV804	HMMPEV801
	Electrical and Hybrid Electric Vehicle	Energy Storage System in EV Application	Drives in Electric Vehicle	Electric Vehicle Laboratory	Electric Vehicle System Design	Mini Project
Renewable Energy	HMCRE501	HMCRE602	HMCRE703	HMLRE701	HMCRE804	HMMPRE801
	Solar Energy System	Wind Energy System	Design of Renewable Energy System	Renewable Energy Laboratory	Grid Integration of Renewable system	Mini Project
Power Electronics and Drives	HMCPD501	HMCPD602	HMCPD703	HMLPD701	HMCPD804	HMMPRE801
	Special Electric Machines & Drives	Industrial Drives	Power Converters and Control for Drives	Advanced Drives Laboratory	Design of Electrical Drives	Mini Project

RHM 2401.6 B. Tech with Honours in Research Degree

For B. Tech with Honours in Research Degree, students need to engage in research projects, either from reputable research organizations like IIT, TIFR, etc. or in exceptional cases at FCRIT depending upon available infrastructure and domain expertize of the guide, in the similar technology discipline.

The proposed curriculum structure and examination scheme are available in the Table RHM 2401.6.1 and Table RHM 2401.6.2, respectively.

In the Research Project Coursework, students are required to participate in Orientation courses/MOOC courses pertinent to their research area or contemporary technological trends. Additionally, they must fulfill assignment-based activities as part of their coursework.

In Research Project-I, the student is tasked with conducting an in-depth literature review, defining the research problem statement, and developing the research methodology.

In Research Project II, the student is responsible for executing the research methodology, analyzing results, and deriving sound conclusions. In Research Project-III, the student is required to compile a comprehensive report and either submit a research paper to a reputable journal or pursue patent filing.

Table RHM 2401.6.1: Curriculum Structure for Honours in Research Degree Program

Course Type	Sem	Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
				L	P	T	L	P	T	Total
RPC	V	RPC501#	Research Project Coursework	2	6	--	2	3	--	5
RP	VI	RPI602@	Research Project – I	--	--	--	--	5	--	5
RP	VII	RP701@	Research Project- II	--	--	--	--	5	--	5
RP	VIII	RP802	Research Project-III	--	--	--	--	3	--	3
			Total	2	6	--	--	18	--	18

Coursework for research projects can begin during the semester break following the fourth semester, lasting for five weeks.

@ Research projects activities shall begin during semester break following fifth , sixth and seventh semesters, with each break lasting approximately six weeks.

NOTE: Those students opting for Honours in Research are required to carry out their internship in the eighth semester from FCRIT only.

Table RHM 2401.6.2: Examination Scheme for Honours in Research Degree Program

				Examination Scheme					
Course Type	Sem	Course Code	Course Name	In-Semester Assessment		End Sem. Exam (ESE)	Exam. Duration for Theory (in Hrs)		Total
				Continuous Assessment	Mid Sem. Exam.		Mid Sem	End Sem	
RPC	V	RPC501	Research Project Coursework	50	--	--	--	--	50
RP	VI	RPI602	Research Project – I	50	--	50**	--	--	100
RP	VII	RP701	Research Project- II	50	--	50**	--	--	100
RP	VIII	RP802	Research Project-III	50	--	--	--	--	50
			Total	200	--	100	--	--	300

**ESE will be in the form of an Open Seminar presented before the Research Assessment Committee (RAC), comprising both Internal and External supervisors, alongside two senior faculty members.

RHM 2401.6 Award of Degree Certificate by the University of Mumbai

If the student completes the Honours/Minor/Honours in Research program but fails in any of the regular courses, then he/she shall not get any degree certificate at that point of time. Degree certificates shall be awarded only after passing the regular degree program and the Honours/Minor/Honours in Research program.

The Honours/Minor/Honours in Research program should be completed in four semesters only (semesters V to VIII).

The following FCRIT regulations related to examinations do not apply to Honours/Minors/Honours in Research Degree Programs as these are applicable for the entire examination and overall results of semesters.

i. RE2404.2

ii. RE2404.3

iii. RE2404.4

iv. RE2404.5

The students successfully completing the Honours/Minor/Honours in Research program Degree shall be awarded the degree designated as: "B. Tech in.....(regular) Engineering with Honours/Minor in (specialization)"

Example 1: Students who successfully complete B. Tech in Mechanical Engineering with a specialization in Supply Chain will be awarded the degree of "B. Tech in Mechanical Engineering with Honours in Supply Chain."

Example 2: Students who successfully complete B. Tech in Electrical Engineering with a Minor in Supply Chain will receive the degree of "B. Tech in Electrical Engineering with Minor in Supply Chain."

Example 3: Students who successfully complete B. Tech in Electronics and Telecommunication Engineering with an Honours in Research will receive the degree of "B. Tech in Electronics and Telecommunication Engineering with Honours in Research."