

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
B.E. in Chemical Engineering
Scheme of Teaching and Examinations 2022
 Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
 (Effective from the academic year 2023-24)

| V SEMESTER | | | | | | | | | | | | | |
|-------------------------------------|-------------------------------|---------|--|---|----------------------------------|----------|--------------------|-----|-------------------|------------|------------|-------------|-----------|
| Sl. No | Course and Course Code | | Course Title | Teaching Department (TD) and Question Paper Setting Board (PSB) | Teaching Hours /Week | | | | Examination | | | | Credits |
| | | | | | Theory Lecture | Tutorial | Practical/ Drawing | SDA | Duration in hours | CIE Marks | SEE Marks | Total Marks | |
| | | | | | L | T | P | S | | | | | |
| 1 | HSMS | BCH501 | Industrial Process Management | CH | 3 | 0 | 0 | | 03 | 50 | 50 | 100 | 3 |
| 2 | IPCC | BCH502 | Chemical Reaction Engineering | CH | 3 | 0 | 2 | | 03 | 50 | 50 | 100 | 4 |
| 3 | PCC | BCH503 | Mass Transfer Operations-I | CH | 4 | 0 | 0 | | 03 | 50 | 50 | 100 | 4 |
| 4 | PCCL | BCHL504 | Mass Transfer Operations Lab-1 | CH | 0 | 0 | 2 | | 03 | 50 | 50 | 100 | 1 |
| 5 | PEC | BCH515x | Professional Elective Course | CH | 3 | 0 | 0 | | 03 | 50 | 50 | 100 | 3 |
| 6 | PROJ | BCH586 | Mini Project | CH | 0 | 0 | 4 | | 03 | 100 | | 100 | 2 |
| 7 | AEC | BRMK557 | Research Methodology and IPR | Any Department | 2 | 2 | 0 | | 02 | 50 | 50 | 100 | 3 |
| 8 | MC | BESK508 | Environmental Studies | Any Department | 2 | 0 | 0 | | 02 | 50 | 50 | 100 | 2 |
| 9 | MC | BNSK559 | National Service Scheme (NSS) | NSS coordinator | 0 | 0 | 2 | | | 100 | | 100 | 0 |
| | | BPEK559 | Physical Education (PE) (Sports and Athletics) | Physical Education Director | | | | | | | | | |
| | | BYOK559 | Yoga | Yoga Teacher | | | | | | | | | |
| | | | | | | | | | Total | 500 | 300 | 800 | 22 |
| Professional Elective Course | | | | | | | | | | | | | |
| BCH515A | Polymer Science & Engineering | | | BCH515C | Material Science and Engineering | | | | | | | | |
| BCH515B | Industrial Pollution Control | | | BCH515D | Chemical Equipment Design | | | | | | | | |

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VI SEMESTER

| Sl. No | Course and Course Code | | Course Title | Teaching Department (TD) and Question Paper Setting Board (PSB) | Teaching Hours /Week | | | | Examination | | | | Credits |
|--|--|---------|---|---|--|----------|--------------------|-----|-------------------|------------|------------|-------------|---------|
| | | | | | Theory Lecture | Tutorial | Practical/ Drawing | SDA | Duration in hours | CIE Marks | SEE Marks | Total Marks | |
| | | | | | L | T | P | S | | | | | |
| 1 | IPCC | BCH601 | Process Equipment Design and Drawing | CH | 3 | 0 | 2 | | 03 | 50 | 50 | 100 | 4 |
| 2 | PCC | BCH602 | Mass Transfer Operations-II | CH | 4 | 0 | 0 | | 03 | 50 | 50 | 100 | 4 |
| 3 | PEC | BCH613x | Professional Elective Course | CH | 3 | 0 | 0 | | 03 | 50 | 50 | 100 | 3 |
| 4 | OEC | BCH654x | Open Elective Course | | 3 | 0 | 0 | | 03 | 50 | 50 | 100 | 3 |
| 5 | PROJ | BCH685 | Project Phase I | CH | 0 | 0 | 4 | | 03 | 100 | -- | 100 | 2 |
| 6 | PCCL | BCHL606 | Mass Transfer Operations lab-2 | CH | 0 | 0 | 2 | | 03 | 50 | 50 | 100 | 1 |
| 7 | AEC/SDC | BCH657x | Ability Enhancement Course/Skill Development Course V | CH | If the course is offered as a Theory | | | | 01 | 50 | 50 | 100 | 1 |
| | | | | | 1 | 0 | 0 | | | | | | |
| | | | | | If course is offered as a practical | | | | | | | | |
| | | | | | 0 | 0 | 2 | | | | | | |
| 8 | MC | BNSK658 | National Service Scheme (NSS) | NSS coordinator | 0 | 0 | 2 | | | 100 | --- | 100 | 0 |
| | | BPEK658 | Physical Education (PE) (Sports and Athletics) | Physical Education Director | | | | | | | | | |
| | | BYOK658 | Yoga | Yoga Teacher | | | | | | | | | |
| 9 | IKS | BIKS609 | Indian Knowledge System | | 1 | 0 | 0 | | 01 | 100 | 0 | 100 | 0 |
| Total | | | | | | | | | 500 | 300 | 800 | 18 | |
| Professional Elective Course | | | | | | | | | | | | | |
| BCH613A | Chemical Process Industries | | | BCH613C | Chemical Process Integration | | | | | | | | |
| BCH613B | Applied Mathematics in Chemical Engineering | | | BCH613D | Petroleum Refinery Engineering | | | | | | | | |
| Open Elective Course | | | | | | | | | | | | | |
| BCH654A | Nano Science and Technology | | | BCH654C | Solid Waste Management in Process Industries | | | | | | | | |
| BCH654B | Principles of Downstream Techniques in Bio process | | | BCH654D | Material Science and Technology | | | | | | | | |
| Ability Enhancement Course / Skill Enhancement Course-V | | | | | | | | | | | | | |
| BCH657A | Technical Report writing and Presentation skills | | | BCH657C | Problem Based learning | | | | | | | | |
| BCH657B | Introduction to start-ups | | | BCH657D | Project Management | | | | | | | | |

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

B.E. in Chemical Engineering**Scheme of Teaching and Examinations 2022**

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2023-24)

| VII SEMESTER (Swappable VII and VIII SEMESTER) | | SCHEME A | | | | | | | | | | | |
|--|------------------------|----------|--|---|----------------------|----------|--------------------|-----|-------------------|------------|------------|-------------|-----------|
| Sl. No | Course and Course Code | | Course Title | Teaching Department (TD) and Question and Paper Setting Board (PSB) | Teaching Hours /Week | | | | Examination | | | | Credits |
| | | | | | Theory Lecture | Tutorial | Practical/ Drawing | SDA | Duration in hours | CIE Marks | SEE Marks | Total Marks | |
| | | | | | L | T | P | S | | | | | |
| 1 | IPCC | BCH701 | Process Modeling and Simulation | CH | 3 | 0 | 2 | | 03 | 50 | 50 | 100 | 4 |
| 2 | IPCC | BCH702 | Process control and Industrial IOT | CH | 3 | 0 | 2 | | 03 | 50 | 50 | 100 | 4 |
| 3 | PCC | BCH703 | Process Engineering Economics and Management | CH | 4 | 0 | 0 | | 03 | 50 | 50 | 100 | 4 |
| 4 | PEC | BCH714x | Professional Elective Course / (Online) | CH | 3 | 0 | 0 | | 03 | 50 | 50 | 100 | 3 |
| 5 | OEC | BCH755x | Open Elective Course / (online) | | 3 | 0 | 0 | | 01 | 50 | 50 | 100 | 3 |
| 6 | PROJ | BCH786 | Major Project Phase-II | CH | 0 | 0 | 12 | | 03 | 100 | 100 | 200 | 6 |
| | | | | | | | | | | 400 | 300 | 700 | 24 |

Professional Elective Course

| | | | |
|---------|---------------------------------------|---------|---------------------------|
| BCH714A | Transport Phenomena | BCH714C | Pharmaceutical Technology |
| BCH714B | Industrial Safety and Risk Management | BCH714D | Biochemical Engineering |

Open Elective Course

| | | | |
|---------|------------------------|---------|----------------------------------|
| BCH755A | Disaster Management | BCH755C | Air Pollution Control Techniques |
| BCH755B | Sustainable Technology | BCH755D | Protein Chemistry |

PCCL: Professional Core Course, **PCCL:** Professional Core Course laboratory, **PEC:** Professional Elective Course, **OEC:** Open Elective Course **PR:** Project Work, **L:** Lecture, **T:** Tutorial, **P:** Practical **S= SDA:** Skill Development Activity, **CIE:** Continuous Internal Evaluation, **SEE:** Semester End Evaluation. **TD-** Teaching Department, **PSB:** Paper Setting department, **OEC:** Open Elective Course, **PEC:** Professional Elective Course. **PROJ:** Project work

Note: VII and VIII semesters of IV years of the program

(1) Institutions can swap the VII and VIII Semester Schemes of Teaching and Examinations to accommodate research internships/ industry internships after the VI semester.

(2) Credits earned for the courses of VII and VIII Semester Scheme of Teaching and Examinations shall be counted against the corresponding semesters whether the VII or VIII semesters is completed during the beginning of the IV year or the later part of IV years of the program.

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VIII SEMESTER (Swappable VII and VIII SEMESTER)

| Sl. No | Course and Course Code | | Course Title | Teaching Department (TD) and Question Paper Setting Board (PSB) | Teaching Hours /Week | | | | Examination | | | Credits | |
|--------|------------------------|---------|--|---|----------------------|----------|--------------------|-----|-------------------|------------|------------|------------|-------------|
| | | | | | Theory Lecture | Tutorial | Practical/ Drawing | SDA | Duration in hours | CIE Marks | SEE Marks | | Total Marks |
| | | | | | L | T | P | S | | | | | |
| 1 | PEC | BCH801x | Professional Elective (Online Courses) | | 3 | 0 | 0 | | 03 | 50 | 50 | 100 | 3 |
| 2 | OEC | BCH802x | Open Elective (Online Courses) | | 3 | 0 | 0 | | 01 | 50 | 50 | 100 | 3 |
| 3 | INT | BCH803 | Internship (Industry/Research) (14 - 20 weeks) | | 0 | 0 | 12 | | 03 | 100 | 100 | 200 | 10 |
| | | | | | | | | | | 200 | 200 | 400 | 16 |

Professional Elective Course (Online courses)

| | | | |
|---------|------------------|---------|------------------|
| BCH801A | (Online Courses) | BCH801C | (Online Courses) |
| BCH801B | (Online Courses) | BCH801D | (Online Courses) |

Open Elective Courses (Online Courses)

| | | | |
|---------|------------------|---------|------------------|
| BCH802A | (Online Courses) | BCH802C | (Online Courses) |
| BCH802B | (Online Courses) | BCH802D | (Online Courses) |

L: Lecture, **T:** Tutorial, **P:** Practical **S= SDA:** Skill Development Activity, **CIE:** Continuous Internal Evaluation, **SEE:** Semester End Evaluation. **TD-** Teaching Department, **PSB:** Paper Setting department, **OEC:** Open Elective Course, **PEC:** Professional Elective Course. **PROJ:** Project work, **INT:** Industry Internship / Research Internship / Rural Internship

Note: VII and VIII semesters of IV years of the program

Swapping Facility

- Institutions can swap VII and VIII Semester Scheme of Teaching and Examinations to accommodate **research internships/ industry internships/Rural Internship** after the VI semester.
- Credits earned for the courses of VII and VIII Semester Scheme of Teaching and Examinations shall be counted against the corresponding semesters whether VII or VIII semester is completed during the beginning of IV year or later part of IV year of the program.

Elucidation:

At the beginning of IV years of the program i.e., after VI semester, VII semester classwork and VIII semester **Research Internship /Industrial Internship / Rural Internship** shall be permitted to be operated simultaneously by the University so that students have ample opportunity for an internship. In other words, a good percentage of the class shall attend VII semester classwork and a similar percentage of others shall attend to Research Internship or Industrial Internship or Rural Internship.

Research/Industrial /Rural Internship shall be carried out at an Industry, NGO, MSME, Innovation center, Incubation centre, Start-up, centre of Excellence (CoE), Study Centre established in the parent institute and /or at reputed research organizations/institutes.

The mandatory Research internship /Industry internship / Rural Internships for 14 to 20 weeks. The internship shall be considered as a head of passing and shall be considered for the award of a degree. Those, who do not take up/complete the internship shall be declared to fail and shall have to complete it during the subsequent University examination after satisfying the internship requirements.

Research internship: A research internship is intended to offer the flavor of current research going on in the research field. It helps students get familiarized with the field and imparts the skill required for carrying out research.

Industry internship: Is an extended period of work experience undertaken by students to supplement their degree for professional development. It also helps them learn to overcome unexpected obstacles and successfully navigate organizations, perspectives, and cultures. Dealing with contingencies helps students recognize, appreciate, and adapt to organizational realities by tempering their knowledge with practical constraints.

Rural Internship: Rural development internship is an initiative of Unnat Bharat Abhiyan Cell, RGIT in association with AICTE to involve students of all departments studying in different academic years for exploring various opportunities in techno-social fields, to connect and work with Rural India for their upliftment.

The faculty coordinator or mentor has to monitor the student's internship progress and interact with them to guide for the successful completion of the internship.

The students are permitted to carry out the internship anywhere in India or abroad. University shall not bear any expenses incurred in respect of the internship.

With the consent of the internal guide and Principal of the Institution, students shall be allowed to carry out the internship at their hometown (**within or outside the state or abroad**), provided favorable facilities are available for the internship and the student remains regularly in contact with the internal guide. **University shall not bear any cost involved in carrying out the internship by students.** However, students can receive any financial assistance extended by the organization.

Professional Elective /Open Elective Course:These are ONLINE courses suggested by the respective Board of Studies. Details of these courses shall be made available for students on the VTU web portal.

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VI SEMESTER SCEHME (B)

| Sl. No | Course and Course Code | | Course Title | Teaching Department (TD) and Question Paper Setting Board (PSB) | Teaching Hours /Week | | | | Examination | | | | Credits |
|--|--|---------|---|---|--|----------|--------------------|-----|-------------------|------------|------------|-------------|-----------|
| | | | | | Theory Lecture | Tutorial | Practical/ Drawing | SDA | Duration in hours | CIE Marks | SEE Marks | Total Marks | |
| | | | | | L | T | P | S | | | | | |
| 1 | IPCC | BCH601 | Process Equipment Design and Drawing | CH | 3 | 0 | 2 | | 03 | 50 | 50 | 100 | 4 |
| 2 | PCC | BCH602 | Mass Transfer Operations-II | CH | 4 | 0 | 0 | | 03 | 50 | 50 | 100 | 4 |
| 3 | PEC | BCH613x | Professional Elective Course | CH | 3 | 0 | 0 | | 03 | 50 | 50 | 100 | 3 |
| 4 | OEC | BCH654x | Open Elective Course | | 3 | 0 | 0 | | 03 | 50 | 50 | 100 | 3 |
| 5 | PCCL | BCHL606 | Mass Transfer Operations Lab-2 | CH | 0 | 0 | 2 | | 03 | 50 | 50 | 100 | 1 |
| 6 | AEC/SDC | BCH657x | Ability Enhancement Course/Skill Development Course V | CH | If the course is offered as a Theory | | | | 01 | 50 | 50 | 100 | 1 |
| | | | | | 1 | 0 | 0 | | | | | | |
| | | | | | If course is offered as a practical | | | | | | | | |
| | | | | | 0 | 0 | 2 | | | | | | |
| 7 | MC | BNSK658 | National Service Scheme (NSS) | NSS coordinator | 0 | 0 | 2 | | | 100 | --- | 100 | 0 |
| | | BPEK658 | Physical Education (PE) (Sports and Athletics) | Physical Education Director | | | | | | | | | |
| | | BYOK658 | Yoga | Yoga Teacher | | | | | | | | | |
| 8 | IKS | BIKS609 | Indian Knowledge System | | 1 | 0 | 0 | | 01 | 100 | 0 | 100 | 0 |
| Total | | | | | | | | | | 500 | 300 | 800 | 16 |
| Professional Elective Course | | | | | | | | | | | | | |
| BCH613A | Chemical Process Industries | | | BCH613C | Chemical Process Integration | | | | | | | | |
| BCH613B | Applied Mathematics in Chemical Engineering | | | BCH613D | Petroleum Refinery Engineering | | | | | | | | |
| Open Elective Course | | | | | | | | | | | | | |
| BCH654A | Nano Science and Technology | | | BCH654C | Solid Waste Management in Process Industries | | | | | | | | |
| BCH654B | Principles of Downstream Techniques in Bio process | | | BCH654D | Material Science and Technology | | | | | | | | |
| Ability Enhancement Course / Skill Enhancement Course-V | | | | | | | | | | | | | |
| BCH657A | Technical Report writing and Presentation skills | | | BCH657C | Problem Based learning | | | | | | | | |
| BCH657B | Introduction to start-ups | | | BCH657D | Project Management | | | | | | | | |

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
B.E. in the title of the program
Scheme of Teaching and Examinations2022
 Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
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| VII and VIII semesters for the candidate those whose can intern with project work | | | | | | | | | | | | | |
|---|------------------------|---------|---|---|----------------------|----------|--------------------|-----|-------------------|------------|------------|-------------|-----------|
| SCHEME B | | | | | | | | | | | | | |
| Sl. No | Course and Course Code | | Course Title | Teaching Department (TD) and Question Paper Setting Board (PSB) | Teaching Hours /Week | | | | Examination | | | | Credits |
| | | | | | Theory Lecture | Tutorial | Practical/ Drawing | SDA | Duration in hours | CIE Marks | SEE Marks | Total Marks | |
| | | | | | L | T | P | S | | | | | |
| 1 | IPCC | BCH701 | Process Modeling and Simulation (To be completed in 5 th /6 th semester) | CH | 3 | 0 | 2 | | 03 | 50 | 50 | 100 | 4 |
| 2 | IPCC | BCH702 | Process control and Industrial IOT (To be completed in 5 th /6 th semester) | CH | 3 | 0 | 2 | | 03 | 50 | 50 | 100 | 4 |
| 3 | PCC | BCH703 | Process Engineering Economics and Management (To be completed in the 5 TH / 6 th semester) | CH | 4 | 0 | 0 | | 03 | 50 | 50 | 100 | 3 |
| 4 | PEC | BCH714x | Professional Elective Course (MOOC Courses) | | 3 | 0 | 0 | | 03 | 50 | 50 | 100 | 3 |
| 5 | OEC | BCH755x | Open Elective Courses(MOOC courses) | | 3 | 0 | 0 | | 01 | 50 | 50 | 100 | 3 |
| | | | | | | | | | | | | | |
| 1 | PEC | BCH801x | Professional Elective (MOOC Courses) | | 3 | 0 | 0 | | 03 | 50 | 50 | 100 | 3 |
| 2 | OEC | BCH802x | Open Elective (MOOC Courses) | | 3 | 0 | 0 | | 01 | 50 | 50 | 100 | 3 |
| 3 | PROJ | BCH881 | Project - outcome of training | | 0 | 0 | 12 | | 03 | 100 | 100 | 200 | 9 |
| 4 | INT | BCH802 | Internship (Industry/Research) (02 semesters) | | 0 | 0 | 12 | | 03 | 100 | 100 | 200 | 10 |
| | | | | | | | | | | 200 | 200 | 400 | 42 |