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|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Title:</b>                                                                                                | Pharmaceutical Science                                                                                                                                                                                                                                                                                              |
| <b>Language of Instruction:</b>                                                                                     | English                                                                                                                                                                                                                                                                                                             |
| <b>Credits:</b>                                                                                                     | 5                                                                                                                                                                                                                                                                                                                   |
| <b>NFQ Level:</b>                                                                                                   | 8                                                                                                                                                                                                                                                                                                                   |
| <b>Module Delivered In</b>                                                                                          | <a href="#">1 programme(s)</a>                                                                                                                                                                                                                                                                                      |
| <b>Teaching &amp; Learning Strategies:</b>                                                                          | This module will be delivered via a one-hour lecture and a three-hour practical per week. . Students may be required to carry out assignments, give presentations and take multiple choice questions. Independent learning will be facilitated during the preparation of assignments, presentations and practicals. |
| <b>Module Aim:</b>                                                                                                  | To understand the procedures in drug production from synthesis to finished product manufacture. To develop analytical procedures for routine pharmaceutical analysis. To understand drug registration requirements.                                                                                                 |
| <b>Learning Outcomes</b>                                                                                            |                                                                                                                                                                                                                                                                                                                     |
| <i>On successful completion of this module the learner should be able to:</i>                                       |                                                                                                                                                                                                                                                                                                                     |
| LO1                                                                                                                 | Understand the procedures in drug production from synthesis to finished product manufacture.                                                                                                                                                                                                                        |
| LO2                                                                                                                 | Develop analytical procedures for routine pharmaceutical analysis.                                                                                                                                                                                                                                                  |
| LO3                                                                                                                 | Understand drug registration requirements. Validate existing drug manufacturing plant and instrumentation.                                                                                                                                                                                                          |
| <b>Pre-requisite learning</b>                                                                                       |                                                                                                                                                                                                                                                                                                                     |
| <b>Module Recommendations</b>                                                                                       |                                                                                                                                                                                                                                                                                                                     |
| <i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>           |                                                                                                                                                                                                                                                                                                                     |
| No recommendations listed                                                                                           |                                                                                                                                                                                                                                                                                                                     |
| <b>Incompatible Modules</b>                                                                                         |                                                                                                                                                                                                                                                                                                                     |
| <i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i> |                                                                                                                                                                                                                                                                                                                     |
| No incompatible modules listed                                                                                      |                                                                                                                                                                                                                                                                                                                     |
| <b>Co-requisite Modules</b>                                                                                         |                                                                                                                                                                                                                                                                                                                     |
| No Co-requisite modules listed                                                                                      |                                                                                                                                                                                                                                                                                                                     |
| <b>Requirements</b>                                                                                                 |                                                                                                                                                                                                                                                                                                                     |
| <i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i>  |                                                                                                                                                                                                                                                                                                                     |
| No requirements listed                                                                                              |                                                                                                                                                                                                                                                                                                                     |

**Module Content & Assessment**
**Indicative Content**
**Pharmaceutical preparation**

1. Introduction requirements for product registration 2. Preformulation: solubility, solubilisation. Polymorphism, eutectic points, degradation profiles. 3. Formulation theory and practice: simple drug delivery vehicles. 4. Accelerated stability and shelf life. Modified release medications. 5. Nanotechnological innovation. 6. Emulsion preparation: surface tension and surface energy. Experimental techniques. 7. Surfactants, critical micelle concentration, spreading and contact angle. Laplace excess pressure. Microemulsions and liquid crystal phases. Aerosols 8. Stability evaluation and chemical assay. Product registration 9. Regulatory bodies, IMB, FDA, etc. 10. Good manufacturing processes: quality management, production activities, internal audits, calibration 11. Validation: policy, documentation, qualification of equipment and ancillaries, process and analytical validation. Cleaning validation and change control. 12. Rejection and reuse of materials. Complaints and recalls. Contract manufacture 13. Materials management. Production & in-process controls.

| Assessment Breakdown             | %      |
|----------------------------------|--------|
| Continuous Assessment            | 10.00% |
| Practical                        | 20.00% |
| End of Module Formal Examination | 70.00% |

**Special Regulation**

Students must achieve a minimum grade (35%) in both practical/CA and final exam.

**Continuous Assessment**

| Assessment Type        | Assessment Description                                                           | Outcome addressed | % of total | Assessment Date |
|------------------------|----------------------------------------------------------------------------------|-------------------|------------|-----------------|
| Short Answer Questions | Regular written examinations to evaluate student understanding of course content | 1,2,3             | 10.00      | n/a             |

No Project

**Practical**

| Assessment Type             | Assessment Description                                                                                                                                                                                                                                                                                                                                  | Outcome addressed | % of total | Assessment Date |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------|-----------------|
| Practical/Skills Evaluation | Dissolution studies of rapid release and controlled-release medications. Formulation of simple emulsion and tablets Assessment of physical stability. Assay development. 16. Use of conductivity to determine solubility products of a number of sparingly-soluble drugs. 17. Extraction by Soxhlet apparatus of podophyllin from podophyllum rhizomes. | 1                 | 20.00      | Sem 1 End       |

**End of Module Formal Examination**

| Assessment Type | Assessment Description | Outcome addressed | % of total | Assessment Date |
|-----------------|------------------------|-------------------|------------|-----------------|
| Formal Exam     | Final year evaluation  | 1,2,3             | 70.00      | End-of-Semester |

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

**Module Workload**

| <b>Workload: Full Time</b> |                    |                                        |
|----------------------------|--------------------|----------------------------------------|
| <i>Workload Type</i>       | <i>Frequency</i>   | <i>Average Weekly Learner Workload</i> |
| Lecture                    | 12 Weeks per Stage | 2.00                                   |
| Practicals                 | 12 Weeks per Stage | 2.50                                   |
| Independent Learning Time  | 15 Weeks per Stage | 5.00                                   |
| Total Hours                |                    | 129.00                                 |

**Module Delivered In**

| Programme Code | Programme                                                                            | Semester | Delivery  |
|----------------|--------------------------------------------------------------------------------------|----------|-----------|
| CW_SABTP_B     | <a href="#">Bachelor of Science (Honours) in Biosciences with Biopharmaceuticals</a> | 7        | Mandatory |