



Ministry of Higher Education and
Scientific Research - Iraq
Al-Mustaqbal University
College for engineering and technology
Department of Biomedical Engineering



MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

| Module Information | | | |
|-----------------------------|------------------------|-------------------------------|----------------------------|
| معلومات المادة الدراسية | | | |
| Module Title | REHABILITATION SCIENCE | | Module Delivery |
| Module Type | CORE | | ✓ Theory ✓ Lecture ✓ |
| Module Code | UOMU0101063 | | |
| ECTS Credits | 5 | | |
| SWL (hr/sem) | 125 | | |
| Module Level | UGx11 UGIII | Semester of Delivery | |
| Administering Department | Biomedical | College | Engineering |
| Module Leader | | e-mail | |
| Module Leader's Acad. Title | | Module Leader's Qualification | |
| Module Tutor | None | e-mail | None |
| Peer Reviewer Name | | e-mail | |
| Review Committee Approval | | Version Number | 1.0 |

| Relation With Other Modules | | | |
|-----------------------------------|------|----------|--|
| العلاقة مع المواد الدراسية الأخرى | | | |
| Prerequisite module | None | Semester | |

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|---|---|----------|--|
| Co-requisites module | None | Semester | |
| Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | | | |
| Module Aims أهداف المادة الدراسية | <p>This technical elective course is titled Rehabilitation Engineering—Prosthetics, Orthotics, Seating and Positioning. The prerequisites are minimal and include knowledge of statics and dynamics.</p> <p>The goal of this course is to apply biomedical engineering principles to the design and development of artificial limbs, orthotic devices, and seating systems. Specific course objectives are:</p> <ol style="list-style-type: none"> 1. to familiarize students with human locomotion in terms of terminology and characterization of normal versus pathologic function; 2. to familiarize students with amputation levels and factors influencing amputation level selection; 3. to familiarize students with lower and upper extremity prosthetic components and factors influencing prosthetic prescription; 4. to familiarize students with lower and upper extremity orthotic components and factors influencing orthotic prescription; 5. to familiarize students with various methods of prosthetic and orthotic control and power; 6. to familiarize students with biomechanical design principles related to seating and stabilization; 7. to familiarize students with commercial products, design principles, and factors influencing prescription and assessment for both wheelchairs and automotive aids. | | |

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| <p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p> | <p>Rehabilitation Science has been defined as “the branch of biomedical engineering that is concerned with the application of science and technology to improve the quality of life of individuals with disabilities”.¹ As such, rehabilitation engineering encompasses prosthetics and orthotics, wheelchair and seating systems, alternative and augmentative communication, environmental control systems, and sensory aids. These fields rely heavily on custom prescription and design, technology, and technology transfer and therefore present numerous opportunities and challenges for biomedical engineers.</p> <p>Inclusion of Rehabilitation Science courses and/or design projects is, therefore,</p> <p>important in biomedical engineering, and many biomedical engineering departments and programs offer courses in rehabilitation at the graduate and/or undergraduate level. These courses focus on prosthetics and orthotics, assistive technology, ergonomics, or rehabilitation engineering design projects. In contrast, the course described in this paper emphasizes clinical problem solving (rather than design projects) and encompasses a broad range of topics.</p> |
| <p>Indicative Contents</p> <p>المحتويات الإرشادية</p> | <p>Indicative content includes the following.</p> <p>This course has been classified as 50% engineering science, 16% engineering design, and 34% basic science (anatomy and physiology). The course includes two 120-minute lectures per week (30 lectures per semester).</p> <p>Lecture topics include: background material (e.g., medical terminology, musculoskeletal anatomy, muscle mechanics, balance and gait analysis, soft tissue mechanics, and amputation levels), lower extremity prosthetics and orthotics, upper extremity prosthetics and orthotics, assistive devices seating and positioning, and wheelchair design.</p> |
| <p>Learning and Teaching Strategies</p> <p>استراتيجيات التعلم والتعليم</p> | |
| <p>Strategies</p> | |

- Lectures: Lectures can be used to introduce students to the basic concepts of Rehabilitation Science. Lectures can also be used to present the latest research in Rehabilitation Science.
- Laboratories: Laboratories provide students with the opportunity to learn by doing. Students can practice using different Rehabilitation Science techniques, working with different designing .
- Group work: Group work can be used to encourage students to collaborate and share ideas. Group work can also be used to help students learn from each other.
- Presentations: Presentations can be used to give students the opportunity to share their knowledge and skills with others. Presentations can also be used to assess students' learning.
- Research projects: Research projects can be used to give students the opportunity to explore a topic in more depth. Research projects can also be used to help students develop their critical thinking skills.
- These are just some of the learning and teaching strategies that can be used for a Rehabilitation Science module. The specific strategies that are used will depend on the specific course and the needs of the students.

Here are some additional tips for teaching a Rehabilitation Science module:

- Use visuals: Visuals can help students understand complex concepts. Consider using diagrams, animations, and videos to illustrate your points.
- Keep it relevant: Make sure that the material you cover is relevant to the students' interests. This will help them stay engaged and motivated.
- Be patient: Rehabilitation Science is a complex field. It may take some time for students to understand the concepts. Be patient and provide them with the support they need.
- Encourage creativity: Rehabilitation Science is a creative field. Encourage students to think outside the box and come up with new ideas.
- Celebrate success: Celebrate students' successes, no matter how small. This will help them stay motivated and engaged.

Student Workload (SWL)

الحمل الدراسي للطالب

| | | | |
|--|-----|--|---|
| Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل | 63 | Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً | 5 |
| Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل | 62 | Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً | 5 |
| Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل | 125 | | |

Module Evaluation

تقييم المادة الدراسية

| | | Time/Number | Weight (Marks) | Week Due | Relevant Learning Outcome |
|-----------------------------|------------------------|-------------|------------------|----------|---------------------------|
| Formative assessment | Quizzes | 2 | 10% (10) | 5, 10 | LO #1, 2, 3 and 4 |
| | Assignments | 1 | 10% (10) | 12 | LO # 5,6 and 7 |
| | Projects / Lab. | | | | |
| | Report | 1 | 10% (10) | 13 | LO # 1-7 |
| Summative assessment | Midterm Exam | 2 hr | 10% (10) | 7 | LO # 1-7 |
| | Final Exam | 2hr | 60% (60) | 16 | All |
| Total assessment | | | 100% (100 Marks) | | |

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

| | Material Covered |
|----------------|---|
| Week 1 | background material |
| Week 2 | medical terminology, musculoskeletal anatomy, |
| Week 3 | muscle mechanics |
| Week 4 | balance and gait analysis |
| Week 5 | soft tissue mechanics |
| Week 6 | amputation levels |
| Week 7 | Mid-term Exam |
| Week 8 | upper extremity prosthetics and orthotics, |
| Week 9 | upper extremity prosthetics and orthotics, |
| Week 10 | lower extremity prosthetics and orthotics, |
| Week 11 | lower extremity prosthetics and orthotics, |

| | |
|----------------|--|
| Week 12 | assistive devices |
| Week 13 | seating and positioning, |
| Week 14 | wheelchair design. |
| Week 15 | Preparatory Week+ Regulatory and Ethical Considerations |
| Week 16 | Final Exam |

| Learning and Teaching Resources مصادر التعلم والتدريس | | |
|---|---|----------------------------------|
| | Text | Available in the Library? |
| Required Texts | [1] Mihailidis, Alex, and Roger Smith, eds. <i>Rehabilitation Engineering: Principles and Practice</i> . CRC Press, 2022. [2] Cooper, Rory A., Hisaichi Ohnabe, and Douglas A. Hobson, eds. <i>An introduction to rehabilitation engineering</i> . CRC Press, 2006. [3] Cooper, Rory A. <i>Rehabilitation engineering applied to mobility and manipulation</i> . CRC Press, 1995. | Yes |
| Recommended Texts | Smith, Raymond V., and John H. Leslie Jr. <i>Rehabilitation engineering</i> . CRC Press, 1990. | Yes |
| Websites | | |

APPENDIX:

| GRADING SCHEME مخطط الدرجات | | | | |
|---------------------------------------|-------------------------|----------------|------------------|---------------------------------------|
| Group | Grade | التقدير | Marks (%) | Definition |
| Success Group (50 - 100) | A - Excellent | امتياز | 90 - 100 | Outstanding Performance |
| | B - Very Good | جيد جدا | 80 - 89 | Above average with some errors |
| | C - Good | جيد | 70 - 79 | Sound work with notable errors |
| | D - Satisfactory | متوسط | 60 - 69 | Fair but with major shortcomings |
| | E - Sufficient | مقبول | 50 - 59 | Work meets minimum criteria |
| Fail Group (0 - 49) | FX – Fail | مقبول بقرار | (45-49) | More work required but credit awarded |
| | F – Fail | راسب | (0-44) | Considerable amount of work required |
| Note: | | | | |

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

