

Subject Description Form

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| Subject Code | BME31110 |
| Subject Title | Biomedical Engineering Laboratories |
| Credit Value | 2 |
| Level | 3 |
| Prerequisite | BME31121 Fundamentals of Biomedical Instrumentation II |
| Objectives | The objectives of this subject are for students to apply basic biomedical engineering principles to design and conduct experimental investigations on living systems. Students will also learn how to design experiments, conduct measurements, and develop analytical skills for the interpretation of data. This course also aims to enhance the technical communication skills of the students. |
| Intended Learning Outcomes | Upon completion of the subject, students will be able to: <ol style="list-style-type: none">a. Demonstrate understanding and apply basic biomedical engineering principles in experimental investigation;b. Design and conduct experimental investigations on living systems;c. Use modern engineering tools (such as LabVIEW and MATLAB) for data acquisition and analysis;d. Apply analytical skills for the interpretation of experimental data;e. Appreciate the limitations of measurements in experimental investigation;f. Prepare technical reports in a professional manner. |
| Contribution to Programme Outcomes (Refer to Part I Section 10) | <ul style="list-style-type: none">▪ Programme Outcome 1: Demonstrate an ability to apply knowledge of mathematics, science, and engineering appropriate to the Biomedical Engineering (BME) discipline. (Teach and Practice)▪ Programme Outcome 2: Demonstrate an ability to design and conduct BME experiments, as well as to analyze and interpret data. (Teach, Practice, and Measure)▪ Programme Outcome 6: Demonstrate an ability to critically evaluate research and professional literature, and understand the principles and practice of conducting research in clinical and industrial environments relevant to BME. (Practice) |

| | <ul style="list-style-type: none"> ▪ Programme Outcome 7: Demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for BME practice. (Teach, Practice, and Measure) ▪ Programme Outcome 8: Demonstrate an ability to use the computer/IT tools relevant to the BME discipline along with an understanding of their processes and limitations. (Practice and Measure) ▪ Programme Outcome 9: Demonstrate an ability to function in multi-disciplinary teams. (Practice) ▪ Programme Outcome 11: Demonstrate an ability to communicate effectively and advise clients, professional colleagues, and other members of the community. (Teach and Practice) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Subject Synopsis/ Indicative Syllabus | <p>Laboratory experiments will be selected from the following list of topics:</p> <ul style="list-style-type: none"> ▪ Electrical safety evaluation ▪ Blood pressure monitoring ▪ Force transducers for biomedical measurements ▪ Biomedical imaging (ultrasound / fluorescence microscopy) ▪ Mobile Healthcare Applications | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Teaching and Learning Methodology | <p>Lecture and laboratories.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Assessment Methods in Alignment with Intended Learning Outcomes | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="width: 20%;">Specific assessment methods/tasks</th> <th rowspan="2" style="width: 10%;">% weighting</th> <th colspan="8">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th style="width: 5%;">a</th> <th style="width: 5%;">b</th> <th style="width: 5%;">c</th> <th style="width: 5%;">d</th> <th style="width: 5%;">e</th> <th style="width: 5%;">f</th> <th style="width: 5%;"></th> <th style="width: 5%;"></th> </tr> </thead> <tbody> <tr> <td>Lab preparation and participation</td> <td style="text-align: center;">20%</td> <td></td> <td style="text-align: center;">√</td> <td style="text-align: center;">√</td> <td></td> <td></td> <td style="text-align: center;">√</td> <td></td> <td></td> </tr> <tr> <td>Lab reports</td> <td style="text-align: center;">80%</td> <td style="text-align: center;">√</td> <td></td> <td></td> <td style="text-align: center;">√</td> <td style="text-align: center;">√</td> <td style="text-align: center;">√</td> <td></td> <td></td> </tr> <tr> <td>Lab skill test*</td> <td style="text-align: center;">Pass/Fail</td> <td style="text-align: center;">√</td> <td></td> <td style="text-align: center;">√</td> <td></td> <td></td> <td style="text-align: center;">√</td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td style="text-align: center;">100%</td> <td colspan="8"></td> </tr> </tbody> </table> <p>*Students must pass this component to pass the course.</p> <p><i>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</i></p> | | | | | | | | | Specific assessment methods/tasks | % weighting | Intended subject learning outcomes to be assessed (Please tick as appropriate) | | | | | | | | a | b | c | d | e | f | | | Lab preparation and participation | 20% | | √ | √ | | | √ | | | Lab reports | 80% | √ | | | √ | √ | √ | | | Lab skill test* | Pass/Fail | √ | | √ | | | √ | | | Total | 100% | | | | | | | | |
| Specific assessment methods/tasks | % weighting | Intended subject learning outcomes to be assessed (Please tick as appropriate) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Lab skill test* | Pass/Fail | √ | | √ | | | √ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 100% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| | <p>Continuous assessment during lab sessions ensures that the student can acquire the needed skills to conduct experimental investigation. Lab reports are used to assess the student's ability to analyze and report experimental findings. To ensure each individual student has acquired the required technical skills, a lab skill test is arranged at the end of the learning sessions.</p> | |
| Student Study Effort Expected | Class contact: | |
| | ▪ Lecture | 3 Hrs. |
| | ▪ Laboratories | 23 Hrs. |
| | Other student study effort: | |
| | ▪ Lab preparation and report writing | 58 Hrs. |
| | Total student study effort | 84 Hrs. |
| Reading List and References | <p><u>References</u></p> <ul style="list-style-type: none"> ▪ Enderle J.D., Blanchard S.M., and Bronzino J.D. Introduction to Biomedical Engineering, 2nd Edition, Elsevier Academic Press, 2005. ▪ Carr J.J. and Brown JM. Introduction to Biomedical Equipment Technology, 4th Edition, Prentice Hall, 2001. ▪ Siciliano A. MATLAB: Data Analysis and Visualization, World Scientific, 2008. ▪ Chan, A.K.Y. Biomedical Device Technology: Principles and Design, Charles C. Thomas Pub., 2008. ▪ Webster J.G. Medical Instrumentation: Application and Design, 4th Edition, Wiley, 2010. ▪ Pond R.J. Introduction to Engineering Technology. Pearson/Prentice Hall, 2009. | |
| Date of Last Major Revision | 24 November 2014 | |
| Date of Last Minor Revision | 01 September 2015 | |