Programme Core Subjects (P)

BETU 1013
TECHNICAL MATHEMATICS

LEARNING OUTCOMES

Upon completion of this subject, student should be able to:

1. Explain the concepts of trigonometry, complex numbers, matrices, and three-dimensional vector operations.
2. Use appropriate methods to solve trigonometry, complex numbers, matrices, and vector operations related problems.
3. Solve application problems using appropriate techniques.

SYNOPSIS

This course has four components; trigonometry, complex numbers, matrices, and three-dimensional vector operations. In trigonometry, the use of trigonometric identities to solve trigonometric equations and its applications will be emphasized. In complex numbers, it covers some fundamental concepts of imaginary numbers and its representations on the complex plane, as well as the representations of the polar and exponential forms of the complex numbers. In matrices, it covers some fundamental concepts such as determinants and inverses of square matrices, Eigen value, as well as solving systems of linear equations using matrices. Three-dimensional coordinate system and vectors operations will also be introduced. This includes the concepts of the dot and the cross products of vectors.

REFERENCES

1. Blitzer, R. (2010). Algebra and trigonometry (4th ed.). Prentice Hall.
2. Leon, S. J. (2010). Linear algebra with applications (8th ed.). Pearson Prentice Hall.
3. Poole, D. (2011). Linear algebra: a modern introduction (3rd ed.). Brooks/Cole.
4. Swokowski, E. W. & Cole, J. A. (2012). Algebra and trigonometry with analytic geometry (13th ed.). Thomson Brooks/Cole.
5. Williams, G. (2011). Linear algebra with applications (7th ed.). Jones and Bartlett Pub.

BETU 1023
CALCULUS FOR TECHNOLOGY

LEARNING OUTCOMES

Upon completion of this subject, student should be able to:

1. Use appropriate methods to find the limits and continuity of a function.
2. Use appropriate methods to differentiate and integrate various functions.
3. Solve application problems using appropriate techniques.

SYNOPSIS

This course introduces the differential and integral calculus of a single variable, with applications. The topics covered are limits and continuity of a function, the derivative with all techniques and methods to differentiate, applications of differentiation such as approximation, related rates, maximum and minimum values, as well as optimization problems. Integration covers methods like substitution, integration by parts, integration by partial fraction decomposition and trigonometric substitution. While its applications cover the area of a bounded region or area between curves as well as the volume of a solid of a revolution.

REFERENCES

1. Abd Wahid Md Raji, et al. (2009). Calculus for science and engineering. Batu Pahat: UTHM.
2. Anton, H., Bivens, I., Davis, S., & Polaski, T. (2009). Calculus: multivariable (9th ed.). Addison-Wesley.
3. Briggs, W., Cochran, L., & Gillett, B. (2011). Calculus: early transcendentals. Pearson Education.
4. Goldstein, L. J., et al. (2010). Calculus and its applications (12th ed.). Pearson Education.
5. Stewart, J. (2008). Calculus: early transcendentals (6th ed.). Brooks/Cole.

BETU 2033
ADVANCED CALCULUS FOR TECHNOLOGY

LEARNING OUTCOMES

Upon completion of this subject, student should be able to:

1. Apply the basic knowledge of multivariable calculus to solve the related problems.
2. Use appropriate methods to find the solutions of the differential equations.
3. Solve application problems using appropriate techniques.

SYNOPSIS

This course has two parts. The first part introduces the vector-valued functions which include the derivative, integration, arc length and curvature of vector functions; partial derivatives that include limits and continuity, chain rule, and maximum and minimum values; and multiple integrals which include the double and triple integrals of multivariable functions. The second part of the course covers the solutions of ordinary differential equations. The topics include solving the first order differential equations using the separable, exact differentiation, and linear equations methods. While solutions of the second order equations covers the homogeneous and the non-homogeneous equations using the undetermined coefficients methods and variation parameters.

REFERENCES

1. Anton, H., Bivens, I., Davis, S., & Polaski, T. (2009). Calculus: multivariable (9th ed.). Addison-Wesley.
2. Brannan, J. R. & Boyce, W. E. (2010). Differential equations with boundary value problems: an introduction to modern methods and applications. John Wiley & Sons.
3. Nagle, K. R., Saff, E. B. & Snider, A. D. (2012). Fundamentals of differential equations (8th ed.). Pearson.
4. Stewart, J. (2008). Calculus: early transcendentals (6th ed.). Brooks/Cole.
5. Zill, D. G. & Cullen, M. R. (2009). Differential equations with boundary-value problems (7th ed.). Brooks/Cole Cengage Learning.

BETU 2043
STATISTICAL METHODS

LEARNING OUTCOMES

Upon completion of this subject, student should be able to:

1. Apply the knowledge of probability and statistics to solve the related problems.
2. Solve problems in statistical inferences related to hypothesis testing.
3. Solve real application problems using appropriate statistical techniques.

SYNOPSIS

This course covers the concept of probability and statistics and their real application problems. Probability topics include all the basic concepts of probability including events and probability, mutually exclusive events, independent events and conditional probability, discrete and continuous random variables. The inferential statistics covers topics like sampling and estimation, hypothesis testing, correlation and simple linear regression. Students will be exposed to a statistical software package.

REFERENCES

1. Devore, J. L. (2012). Probability and statistics for engineering and the sciences (8th ed.). Brooks/Cole Cengage Learning.
2. Montgomery, D. C., Runger, G. C. & Hubele, N. F. (2011). Engineering statistics (5th ed.). SI Version. John Wiley & Sons.
3. Montgomery, D. C. & Runger, G. C. (2011). Applied statistics and probability for engineers (5th ed.). John Wiley & Sons.
4. Navidi, W. (2011). Statistics for engineers and scientists (3rd ed.). McGraw-Hill.
5. Vining, G. G. & Kowalski, S. (2011). Statistical methods for engineers (3rd ed.). Brooks/Cole Cengage Learning.

BETU 4053
ENGINEERING ETHICS & OSHE

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. recognize the fundamental principles of Professional Ethics and various behavior or conducts that need to be observed and controlled by a professional technologists.
2. identify moral problems that related to engineering ethics and to solve the problem using various appropriate methods.
3. explain the concepts in context of engineering ethics and to relate it with the actual phenomena.
4. define the responsibilities of engineering technologists in the scope of their function in any organization either as an employee or as an employer and have a feeling of being a responsible and public safety and environmental conscious technologist.
5. define the Occupational Health concept, understand the critical occupational safety health hazard that the workers exposed themselves in the factory working environment, how to prevent or at least minimize these hazards.

SYNOPSIS

This subject will discuss the concept and cases of engineering ethics ; Introduction to professional ethics, engineering ethics as preventive ethics, framing the ethical problems, methods for moral problem solving, creative middle ways, organizing principles, utilitarian concept, minimalist views, respect for persons, reversibility, universal ability, responsible engineering technologists, reasonable care, good works, honesty, integrity, reliability, conflict of interest, engineering technologist as employees, engineering technologist as employers, engineers and environment, international engineering professionalism. At the end of the course, the student will be taught on the OSHA, critical safety and health hazards, first aids procedures and practice, its organization and how the OSHA manage to monitor the safety and the health effectively, case study on the occupational safety and health.

REFERENCES

None

BLHW 1722
PHILOSOPHY OF SCIENCE & TECHNOLOGY

LEARNING OUTCOMES

At the end of this course, students should be able to:

1. explain the concept of science and technology in ancient and current civilizations as well as their impact on the development of philosophy of science and technology via group presentations.
2. elaborate the concept of knowledge, philosophy of science and technology from the Islamic perspective appropriately.
3. interrelate the principles, influences and impact of science and technology in the context of Islamic civilization and nation development via group activities.

SYNOPSIS

This course discusses the concept of knowledge, philosophy of science and technology according to the perspectives of Muslim and Western scholars. The concept and achievements of Islamic civilization are also disscussed because science and technology is a phenomenon which develops in line with the development of society and its environment.

REFERENCES

1. Radzuan Nordin, Ahmad Ridzwan Mohd Noor, Norliah Kudus, Nor Azilah Ahmad, Shahrulanuar Mohamed, Ali Hafizar Mohamad Rawi, Ismail Ibrahim & Mahadi Abu Hassan. (2008). Modul Falsafah Sains dan Teknologi. Cetakan Dalaman UTeM.
2. Yahaya Jusoh & Azhar Muhammad. (2007). Pendidikan Falsafah Sains Al-Quran. Skudai: Penerbit UTM Press.
3. Osman Bakar. (2008). Tauhid dan Sains: Perspektif Islam Tentang Agama dan Sains Edisi Kedua. Bandung: Pustaka Hidayah.