
Master of Science Teaching of Mathematics

Academic Session 2015/2016



School of Mathematical Sciences

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ACADEMIC CALENDAR - ACADEMIC SESSION 2015/2016
FOR ALL SCHOOLS (EXCEPT THE SCHOOL OF MEDICAL SCIENCES AND SCHOOL OF DENTAL SCIENCES)

***Registration for New Students / Orientation Week 1-6 September 2015**

SEM	WEEK	ACTIVITY	DATE	REMARKS
ONE	1	Teaching & Learning Period (T&LP – 9 Week)	Monday, 07.09.2015 - Sunday, 13.09.2015	16.09.2015, Wednesday - Malaysia Day 24.09.2015, Thursday - Eid-ul adha
	2		Monday, 14.09.2015 - Sunday, 20.09.2015	
	3		Monday, 21.09.2015 - Sunday, 27.09.2015	
	4		Monday, 28.09.2015 - Sunday, 04.10.2015	14.10.2015, Wednesday - Maal Hijrah
	5		Monday, 05.10.2015 - Sunday, 11.10.2015	
	6		Monday, 12.10.2015 - Sunday, 18.10.2015	
	7		Monday, 19.10.2015 - Sunday, 25.10.2015	
	8		Monday, 26.10.2015 - Sunday, 01.10.2015	
	9		Monday, 02.11.2015 - Sunday, 08.11.2015	
	10	Mid Semester Break	Monday, 09.11.2015 - Sunday, 15.11.2015	10.11.2015, Tuesday - Deepavali
	11	Teaching & Learning Period (T&LP – 5 Week)	Monday, 16.11.2015 - Sunday, 22.11.2015	
	12		Monday, 23.11.2015 - Sunday, 29.11.2015	
	13		Monday, 30.11.2015 - Sunday, 06.12.2015	
	14		Monday, 07.12.2015 - Sunday, 13.12.2015	
	15		Monday, 14.12.2015 - Sunday, 20.12.2015	
	16	Revision Week	Monday, 21.12.2015 - Sunday, 27.12.2015	24.12.2015, Thursday - Maulidur Rasul 25.12.2015, Friday - Christmas
	17	Examinations (3 Week)	Monday, 28.12.2015 - Sunday, 03.01.2016	01.01.2016, Friday - New Year
	18		Monday, 04.01.2016 - Sunday, 10.01.2016	
	19		Monday, 11.01.2016 - Sunday, 17.01.2016	
	20	Mid Semester Break (4 Week)	Monday, 18.01.2016 - Sunday, 24.01.2016	08.02.2016, Monday & 09.02.2016, Tuesday - Chinese New Year
	21		Monday, 25.01.2016 - Sunday, 31.01.2016	
	22		Monday, 01.02.2016 - Sunday, 07.02.2016	
	23		Monday, 08.02.2016 - Sunday, 14.02.2016	
TWO	24	Teaching & Learning Period (T&LP – 7 Week)	Monday, 15.02.2016 - Sunday, 21.02.2016	
	25		Monday, 22.02.2016 - Sunday, 28.02.2016	
	26		Monday, 29.02.2016 - Sunday, 06.03.2016	
	27		Monday, 07.03.2016 - Sunday, 13.03.2016	
	28		Monday, 14.03.2016 - Sunday, 20.03.2016	
	29		Monday, 21.03.2016 - Sunday, 27.03.2016	
	30		Monday, 28.03.2016 - Sunday, 03.04.2016	
	31	Mid Semester Break	Monday, 04.04.2016 - Sunday, 10.04.2016	
	32	Teaching & Learning Period (T&LP – 7 Week)	Monday, 11.04.2016 - Sunday, 17.04.2016	03.05.2016, Sunday - Wesak Day
	33		Monday, 18.04.2016 - Sunday, 24.04.2016	
	34		Monday, 25.04.2016 - Sunday, 01.05.2016	
	35		Monday, 02.05.2016 - Sunday, 08.05.2016	
	36		Monday, 09.05.2016 - Sunday, 15.05.2016	
	37		Monday, 16.05.2016 - Sunday, 22.05.2016	
38	Monday, 23.05.2016 - Sunday, 29.05.2016			
39	Revision Week	Monday, 30.05.2016 - Sunday, 05.06.2016		
40	Examinations (3 Week)	Monday, 06.06.2016 - Sunday, 12.06.2016	04.06.2016, Saturday - Agong's Birthday 22.06.2016, Wednesday - Nuzul Al-Quran	
41		Monday, 13.06.2016 - Sunday, 19.06.2016		
42		Monday, 20.06.2016 - Sunday, 26.06.2016		
*KSCP	43	Long Vacation/ Industrial Training/ KSCP (10 Week)	Monday, 27.06.2016 - Sunday, 03.07.2016	07.07.2016, Thursday & 08.07.2016, Friday - Eid-ul fitr
	44		Monday, 04.07.2016 - Sunday, 10.07.2016	
	45		Monday, 11.07.2016 - Sunday, 17.07.2016	
	46		*T&LP Monday, 18.07.2016 - Sunday, 24.07.2016	
	47		Monday, 25.07.2016 - Sunday, 31.07.2016	
	48		*Examination Monday, 01.08.2016 - Sunday, 07.08.2016	
	49		Monday, 08.08.2016 - Sunday, 14.08.2016	
	50		Monday, 15.08.2016 - Sunday, 21.08.2016	
	51		Monday, 22.08.2016 - Sunday, 28.08.2016	
	52		Monday, 29.08.2016 - Sunday, 04.09.2016	

IMPORTANT DATES FOR FULL TIME CANDIDATES MGM599/8 PROJECT COURSE

ACADEMIC SESSION 2015/2016

Candidates submit the supervisor confirmation form to the General Office, School of Mathematical Sciences on or before **18 Disember 2015**



Candidates register 2nd Semester course, Academic Session **2015/2016**
** Candidates are required to have accumulated 12 units*



Deadline for candidates to submit 4 copies (soft cover) for examination **on or before 43rd week** of Academic Calendar Academic Session **2015/2016**



Seminar & Viva voce will be held **on 45th – 47th week** of Academic Calendar – Academic Session **2015/2016**

**IMPORTANT DATES FOR PART TIME CANDIDATES
MGM599/8 PROJECT COURSE
(for 2015/2016 intake)**

ACADEMIC SESSION 2015/2016

Candidates submit the supervisor confirmation form to the General Office, School of Mathematical Sciences on or before **31 July 2015**



Candidates register Semester I course, Academic Session **2015/2016**
** Candidates are required to have accumulated 12 units*



Deadline for candidates to submit 4 copies (soft cover) for examination on or before **43rd week** of Academic Calendar Academic Session **2015/2016**



Seminar & Viva voice will be held on **45th – 47th week** of Academic Calendar – Academic Session **2015/2016**

Submission date of supervisor confirmation form for part-time students for intake Academic Session **2015/2016** is on or before **17 June 2016**.

MASTERS IN TEACHING OF MATHEMATICS

A. OBJECTIVE

The objective of the program is to increase teachers' expertise in teaching mathematics courses at pre-university level more effectively in addition to nurturing research activities among teachers.

B. PROGRAM STRUCTURE

Candidates have to complete 44 units of the required coursework consisting of 32 units of compulsory courses (including 8 units Project) and 12 units of elective courses by obtaining at least a B grade and achieving a CGPA of at least 3.0. Candidates are also required to participate in seminars organized by the School of Mathematical Sciences from time to time.

The program is offered either on a full time or part time basis. The minimum period for full time candidates are 3 semesters (18 months) and a maximum period of 4 semesters (24 months). For part time candidates, the minimum period is 5 semesters (30 months) and a maximum period of 8 semesters (48 months).

C. COURSES

Compulsory (32 units):

MGM502/4 : Number Theory (*Teori Nombor*)
 MGM511/4 : Linear Algebra (*Aljabar Linear*)
 MGM531/4 : Euclidean Geometry (*Geometri Euclidean*)
 MGM551/4 : Operations Research (*Penyelidikan Operasi*)
 MGM561/4 : Statistical Methods For Research (*Kaedah Statistik untuk Penyelidikan*)
 MGM562/4 : Probability Theory (*Teori Kebarangkalian*)
 MGM599/8 : Project (*Projek*)

Electives (12 units, choose 3 courses):

MGM501/4 : Analysis
 MGM503/4 : Combinatorics (*Kombinatorik*)
 MGM563/4 : Statistical Inference (*Pentaabiran Statistik*)
 MGM581/4 : Mathematics and Technology (*Teknologi dan Matematik*)
 PLG561/4 : Theories of Teaching and Learning Mathematics
 (*Teori Pengajaran dan Pembelajaran dalam Matematik*)

Note:

- Groups of 2 compulsory courses (with the exception of MGM599/8) are offered two years in a row in different semesters and then skipped in the third year.
- Elective courses (with the exception of PLG561/4) are offered in the same semester in alternate years.

(please refer to the following Table of Course Offering in planning your courses).

**TABLE OF COURSE OFFERING
(Commencing on 2015/2016 Session)**

2015 / 2016	Compulsory	Elective	Compulsory	Elective
	MGM531/4	MGM581/4	MGM502/4	MGM563/4
	MGM551/4	PLG561/4	MGM561/4	
	MGM599/8		MGM599/8	
2016 / 2017	Compulsory	Elective	Compulsory	Elective
	MGM511/4	MGM503/4	MGM531/4	MGM501/4
	MGM562/4	PLG561/4	MGM551/4	
	MGM599/8		MGM599/8	
2017 / 2018	Compulsory	Elective	Compulsory	Elective
	MGM502/4	MGM581/4	MGM511/4	MGM563/4
	MGM561/4	PLG561/4	MGM562/4	
	MGM599/8		MGM599/8	
2018 / 2019	Compulsory	Elective	Compulsory	Elective
	MGM531/4	MGM503/4	MGM502/4	MGM501/4
	MGM551/4	PLG561/4	MGM561/4	
	MGM599/8		MGM599/8	
2019 / 2020	Compulsory	Elective	Compulsory	Elective
	MGM511/4	MGM581/4	MGM531/4	MGM563/4
	MGM562/4	PLG561/4	MGM551/4	
	MGM599/8		MGM599/8	

NOTE: Apart from MGM599, part-time candidates are advised to take 1 compulsory and 1 elective courses in each semester. Apart from MGM599 and PLG561, full-time candidates are advised to take all courses being offered in each semester. Candidates must register at least 1 course every semester to maintain his/her candidacy. Candidates must request for a postponement if no course are registered in that particular semester. Candidates are advised not to take more than 16 units of courses in any semester.

REGISTERING FOR PROJECT (MGM599/8)

Part-time students who entered the MSc Teaching Mathematics program in the 1st. semester will normally register for MGM599 in their second academic year after they have accumulated 12 units whereas those who entered the program in the 2nd. Semester may/may not be able to register for MGM599 in the following academic year (since part-time students are advised to take only 8 units of courses per semester). Full-time students who entered the MSc Teaching Mathematics program in the 1st. semester can choose to register for MGM599 in the 2nd. Semester of their first year to achieve a minimum period of candidacy; however, this requires them to obtain a supervisor during their first semester in the program. Full-time students who entered the MSc Teaching Mathematics in the 2nd. Semester have no choice but to wait for the following academic year to register for MGM 599 where they can choose either to register in the 1st. Semester or 2nd. Semester. More information is provided in the synopsis of the course.

SYNOPSIS OF COMPULSORY COURSES

1.0 MGM502 /4 Number Theory (*Teori Nombor*)

Peano's Axiom and the principle of mathematical induction.
Divisibility of integers and their representation as a product of primes.
Arithmetic Modulo : Chinese remainder theorem.
Arithmetic Functions.
Quadratic residue

Use of number theory in cryptography. The RSA cryptography system. Using quadratic residue to construct a cryptography system.

References

1. Strayer J. K. (2001). *Elementary Number Theory*, Waveland Press Inc.
2. Adlier A. & Coury J. E. (1995). *Theory of Numbers, s* : A Text and Source Book of Problems, Jones and Bartlett Publishers.
3. Schroeder M. R. (1985). *Number Theory in Science and Communication*, Springer-Verlag.

2.0 MGM511/4 Linear Algebra (*Aljabar Linear*)

Linear transformation on a finite dimensional space, and the matrix representation of a linear transformation.

Use of linear transformation in solving several geometrical problems like rotation and reflection.

The inner product operation, and the use of this operation in curve fitting through least square method.

Use of linear algebra in coding theory.

References

1. Pretzel O., (1992). *Error Correcting Codes and Finite Fields*. Clarendon Press, Oxford.
2. Leon S. J., (1986). *Linear Algebra with Applications*, Macmillan Publishing Company.
3. Shu Lin & Costello D. J. Jr. (2004). *Error Control Coding : Fundamentals and Applications*. Prentice Hall, Indiana, U.S.A.

3.0 MGM531/4 Euclidean Geometry (*Geometri Euclidean*)

A detailed discussion of Euclid's Axioms, and their applications in determining geometrical properties such as parallel lines, congruent triangles, similar triangles and circles.

Expanding the Euclidean space to projective geometric space. Explaining several daily phenomenon using projective geometry.

Introduction to non-Euclidean geometry.

References

1. Coexter H. S. M., (1969). *Introduction to Geometry*, 2nd Edition, John Wiley & Sons, New York.
2. Schreider O. & Sperner E., (1985). *Projective Geometry of n-dimensions*, Chelsea Publishing Company.
3. Bouswma W. D., (1972). *Geometry for Teachers*, Macmillan Company.
4. Seidenberg A. (1962). *Lectures on Projective Geometry*. Van Nostrand Company Inc.
5. Ballico E. (1994). *Projective Geometry with Applications*, Marcel-Dekker.

4.0 MGM551/4 Operations Research (*Penyelidikan Operasi*)

Linear Programming (LP): LP Model formulation, Graphical solution and its sensitivity analysis, Standard LP model, Simplex method, Artificial variables techniques, Special cases, sensitivity analysis of optimal tableau, Dual problem.

Game Theory: Matrix Games, Mixed Strategy, Basic Theorems of Game Theory, $k \times 1$ Game solution, Matrix Games as a Linear Programming.

Project Management – Critical Path Analysis (PERT/CPM): Building the Arrow Diagram, Critical Path Analysis, Floats, Probabilistic Methods.

Graph Theory and Networks: Definitions and examples, Euler Graphs, Hamiltonian Graph, Chinese Postman Problem, Traveling Salesman Problem.

References

1. Taha, H. A. (2007). *Operations Research: An Introduction* (8th Ed.), Prentice-Hall.
2. Haji Ismail Mohd. (1991). *Teori dan Penggunaan Pengaturcaraan Linear*, DBP.
3. Muhamad Jantan (1987). *Pengantar Penyelidikan Operasi*, Penerbit USM.
4. Brian D. Bunday (1994). *Asas Pengaturcaraan Linear*, Interpreter : Zuhaimy Hj. Ismail, Unit Penerbitan Akademik UTM.
5. Wilson, R. J. (1991). *Pengenalan Teori Graf*, Interpreter : Faridah Maarof, Mohd. Yunus Majid dan Habibollah Haron, Unit Penerbitan Akademik UTM.
6. Fryer M. J. (1978). *An Introduction to Linear Programming and Matrix Game Theory*, Edward Arnold, London.

5.0 MGM561/4 Statistical Methods for Research (*Kaedah Statistik untuk Penyelidikan*)

Descriptive Statistics

Data Presentation : Graphical Methods

Data Presentation : Measure of Central Tendency

Data Presentation : Measure of Variability/Dispersion

Empirical Rule

Chebychev's Rule

Probability : Sets and Events, Probability Laws, Probability distribution

Random variables and Probability Distribution : One and Two Variables

Discrete Probability Distributions

Continuous Probability Distributions

Sampling Distributions : Sampling Distributions for Mean and Proportion, Central Limit Theorem

Estimation : Point Estimation, Interval Estimation

Hypothesis Testing

Hypothesis Test : The Null and the Alternative Hypotheses, Significance Level, Rejection Region.

Test Statistics, Decision Error

Hypothesis testing for Population Mean

Hypothesis testing for Population Proportion

Chi-Square Fit Test, Goodness-of-fit Test, Contingency Tables, Tests for Independence and Homogeneity

Inferences About Population Variances

One Way Analysis of Variances (ANOVA)

Simple Linear Regression, Prediction and Linear Correlation

Time Series Analysis, Index Numbers

Introduction to Research Methodological

Applications to the Field of Education

References

1. Ott L., (1993). *An Introduction to Statistical Methods and Data Analysis*, Duxbury Press.
2. Bhattacharayya & Johnson (1977). *Statistical Concepts and Methods*, John Wiley & Sons.
3. Chatfield C. (1984). *The Analysis of Time Series: An Introduction*, Chapman & Hall, 3rd Ed.
4. Aggarwal Y. P. (1990). *Statistical Methods : Concepts, application and computations*, Sterling Publishers.
5. Alias Baba (1997). *Statistik Penyelidikan Dalam Pendidikan dan Sains Sosial*, Bangi: Penerbit UKM.

6.0 MGM562/4 Probability Theory (*Teori Kebarangkalian*)

Counting Techniques : permutation and combination

Basic Probability Concepts : sample space and events, set definition, intersection, union, complement, axioms of probability, Venn diagram, Tree diagram, mutually exclusive events and independent events

Dependent Events : Conditional probability, Bayes' Theorem

Random Variables : discrete and continuous variables, probability density function, cumulative distribution function

Expectation and Distribution : expected values, variance and standard deviation, moment generating function, probability generating function, Chebyshev's inequality

Discrete Distributions : Bernoulli, Binomial, Poisson, Hypergeometric and Negative Binomial

Continuous Distributions : Uniform, Normal, Exponential, Chi-squared, Gamma, Beta, t and F distributions

Bivariate Variables : joint density function, joint cumulative function, marginal density function, conditional density, conditional expectation

Probability Theory in Decision Analysis

References

1. Ross, S. M. (2000). *Introduction to Probability Models* (7th edition), Academic Press
2. Hogg, R. V. & Craig, A.T.(1978). *Introduction to Mathematical Statistics* (3rd. Edition), New York: Macmillan.
3. Mood, A. M., Graybill, F.A. & Boes, D. C. (1974). *Introduction to the Theory of Statistics* (3rd. Edition). New York: McGraw-Hill.
4. Khatijah Syed Ahmad (1996). *Pengantar Teori Statistik, USM*.

7.0 MGM599/8 Project (*Projek*)

In general, students must obtain at least 12 units before they can register for this course. The course is offered both in the 1st. and 2nd. Semesters of the academic year. However, PART-TIME students are only allowed to register the course in the 1st. semester whereas FULL-TIME students are allowed to register for the course in the 1st. or 2nd. Semester. The duration of the course is TWO SEMESTERS FOR PART-TIME students and ONE SEMESTER FOR FULL-TIME students.

PART-TIME STUDENTS

Students must:

1. Fill-up and submit the *Project Supervisor Confirmation* form no later than the first week of 2nd. Semester's Final Exam.
2. Register 1st. Semester of the following Academic Year (students will obtain an incomplete grade).
3. Submit a report in May/June towards the end of 2nd. Semester (of the same academic year) and complete the seminar + *viva voce* requirement (please refer to the main office for exact dates).
4. Grade will be announced after KSCP ("*Kursus Semasa Cuti Panjang*").

FULL-TIME STUDENTS (Registering MGM599/8 in 1st. Semester)

1. Fill-up and submit the *Project Supervisor Confirmation* form no later than the first week of 2nd. Semester's Final Exam.
2. Register in the 1st. Semester of the following Academic Year.
3. Submit the report and complete the seminar + *viva voce* requirement before the end of the same semester (please refer to the office for the exact dates).
4. Grade will be announced concurrent with the 1st. Semester's course results.

FULL-TIME STUDENTS (Registering MGM599/8 in 2nd. Semester)

1. Fill up and submit the *Project Supervisor Confirmation* form no later than Week 10 of the 1st. Semester.
2. Register in the 2nd. Semester of the same Academic Year.
3. Submit a report in May/June towards the end of 2nd. Semester and complete the seminar + *viva voce* requirement (please refer to the main office for exact dates).
4. Grade will be announced after KSCP ("*Kursus Semasa Cuti Panjang*").

Students who have registered this Project course in any of the academic sessions are required to submit their project (after confirmation by their respective supervisors) no later than **a date that will be determined in July**. This will be followed by a seminar and finally the viva. The viva will begin with a short oral presentation by the student regarding his/her achievements followed by a question and answer session.

Further details can be found in the MGM599/9 guidelines. All academic staff of the School of Mathematical Sciences can be a project supervisor for this MGM599/9 Project course.

SYNOPSIS OF ELECTIVE COURSES

1.0 MGM501/4 Analysis (*Analisis*)

1. Introduction : the set of natural numbers, the set of rational numbers, the set of real numbers, the completeness axiom.
2. Sequences : limits of sequences, monotone sequences, Cauchy sequences, subsequences, Bolzano-Weirstrass theorem.
3. Continuity : continuous functions, uniform continuity, limits of functions.
4. Differentiation : basic properties of a derivative, the Mean Value Theorem, L' Hospital Rule, Taylor Theorem.
5. Integration : the Riemann Integral, Fundamental Theorem of Calculus, Improper Integral.

References

1. Jerrold E. Marsden (1974). *Elementary Classical Analysis*, W.H. Freeman and Co.
2. Kenneth A. Ross (1991). *Elementary Analysis : The Theory of Calculus*, Springer-Verlag.
3. Rosihan M. Ali & Ong Boon Hua, (1999). *Pengantar Analisis*, Penerbit USM.

2.0 MGM503/4 Combinatorics (*Kombinatorik*)

This course will discuss topics in discrete mathematics such as :

Permutations and Combinatorics
 Distributions and Combinatorics
 Combinatorics on a chessboard
 Recurrence Relations
 Generating Functions
 Combinatorics and Series

References

1. Dogart K. P. (1988). *Discrete Mathematics*, D. C. Heath & Co., Lexington.
2. Dossey J. A. (1987). *Discrete Mathematics*, Scott Foresman & Co., Glenville, ILL.
3. Ya Vilenking N. (1971). *Combinatorics*, Academic Press.
4. Grimaldi R. P (1994). *Discrete and Combinatorial Mathematics: An Applied Introduction*, Addison-Wesley.
5. Johnsonbaugh R. (1996). *Discrete Mathematics*, Prentice-Hall.

3.0 MGM563/4 Statistical Inference (*Pentaabiran Statistik*)

Statistical Distributions : The Bernoulli, Binomial, Multinomial, Poisson, Exponential, Gamma, Chi-Square, Normal and Bivariate Normal Distributions.

Transformations of variables : Jacobian of the transformation. Derivation of the t distribution and F distribution.

Sampling Distributions : Sampling from the normal distribution. Order Statistics. Marginal distributions and Joint distributions of order statistics. Distributions of functions of order statistics. Convergence in probability. Convergence in distribution. Limiting distributions. Limiting moment generation function.

Point Estimation : Methods of finding point estimators. Properties of an estimator such as unbiasedness, efficiency, consistency, completeness and sufficiency. Rao-Blackwell's Theorem. Complete family of density functions, exponential family of density functions. Lehmann-Scheffe's Theorem. Locations invariance and scale invariance.

Interval Estimation : Confidence interval. Methods of constructing confidence intervals : pivotal quantity method, statistical method. Confidence interval for large sample.

Hypothesis Testing : Simple hypothesis. Composite hypothesis. Power function. Most powerful test. Uniformly most powerful test. Likelihood ratio test.

Bayes approach.

References

1. Hogg R. V., & Craig A. T., (1978). *Introduction to mathematical statistics* (4th Edition), Macmillan.
2. Ahmad K. S. (1996). *Pengantar teori statistik*, Penerbit USM.
3. Lehmann E. L., (1986). *Testing statistical hypotheses* (Ed ke-2), New York: Wiley.
4. Mood A. M., Graybill F. A., & Boes D. C., (1974). *Introduction to the theory of statistics* (Ed. ke-3), New York : McGraw-Hill.
5. Rohatgi, V. K., (1976). *An introduction to probability theory and mathematical statistics*, New York: Wiley.

4.0 MGM581/4 Mathematics and Technology (*Matematik dan Teknologi*)

Technology in mathematics

- History and current situation.

Mathematics softwares

- Strengths and weaknesses. Effective use of softwares in technology.

Graphing Calculator

- Introduction and fundamental operations.

Computer Algebra Systems

- Explore and investigate topics in calculus and differential equations using graphing calculators.
- Application of certain topics to real world problems in promoting mathematical understanding.

Students version of mathematics softwares

- Fundamental operations.
- The use of mathematics softwares as an aid to solve and explore a variety of mathematical problems and applications.

Visualization in Mathematics

- Usage of softwares to display mathematical concepts.

Internet I

- Browser, searching of research and teaching materials, ps file, pdf.zip.

Internet II

- HTML and Java Script programming.

References

1. Zainuddin Z. (2005). *Exploring topics in calculus and differential equations using the TI-92 Plus graphing calculator*- Compilation of notes.
2. <http://education.ti.com>.
3. <http://www.connecting.t3.com>.
4. [Kythe P. K.](#), Puri P. & Schaferkotter M. R. (2003) *Partial Differential Equations and Boundary Value Problems with Mathematica*, 2nd Edition, Chapman & Hall/CRC.
5. The *Mathematica* Journal : www.mathematica-journal.com *Mathematica* in Education and Research, ISSN 1096-3324, published quarterly by iJournals : http://www.ijournals.net/index.php?option=com_frontpage&Itemid=1.

5.0 PLG561/4 Theories of Teaching and Learning Mathematics (Teori Pengajaran dan Pembelajaran dalam Matematik)

This course aims to equip students with the contemporary research studies related to the theories of teaching and learning mathematics. The course discussion will focus on the development of mathematics learning theories and the implications of these theories on the teaching and learning of mathematics in schools will also be discussed. The course syllabus includes :

1. Cognitive theories in the learning of mathematics such as constructivism, radical constructivism, social constructivism including the works of Dienes, Bruner, Piaget, Skemp, von Glasserfield and Vygotsky.
2. Information processing theory of Ausubel and Gagne.
3. Representation and Understanding in mathematics : Visualization and Imagery.
4. Implications of learning theories toward the teaching of mathematics in schools.
5. Implications of learning theories toward research in mathematics education.

References

1. Ausubel, D. P. (2000). *The acquisition and retention of knowledge: A cognitive view*. Kluwer Academic Publishers.
2. Bishop, A. J. (Ed.) (1996). *International handbook of mathematics education*. Kluwer Academic Publishers.
3. Copeland, R. W. (1974). *How Children learn mathematics: Teaching implications of Piaget's research*. Macmillan Publishing Co.
4. Gredler, M. E. (1997). *Learning and Instruction: Theory into practice*. Prentice-Hall.
5. Dienes Z. P. (1964). *The Power of Mathematics*, Hutchinson Educational.
6. Dienes, Z. P. (1960). *Building up mathematics*. Hutchinson Educational.
7. Ernest, P. (1998) *Social Constructivism as a Philosophy of Mathematics*, Albany, New York: SUNY Press.
8. Gagne, R. M. (1985). *The conditions of learning and theory of instruction*. CBS Publishing Asia Ltd.
9. Von Glasserfield, E. (1991)(Ed.). *Radical Constructivism in mathematics education*. Kluwer Academic Publishers.
10. Grouws, D. A. Ed. (1992) *Handbook of Research on Mathematics Teaching and Learning*, New York: Macmillan.
11. Harries, T., & Spooner, M. (2000). *Mental Mathematics for the numeracy hour*. London: David Fulton Publishers.
12. Hiebert, James (1987)(Ed.). *Conceptual and procedural knowledge : the case of mathematics*. Hillsdale, N.J.: Lawrence Erlbaum Associates.
13. Janvier, C. (Ed) (1987) *The Problems of Representation in Mathematics*, Erlbaum, London.
14. Moll, L. C. (1990). *Vygotsky and Education: Instructional applications of sociohistorical psychology*. Cambridge University Press.
15. Nunes, T., & Bryant, P. (1997) (Eds.). *Learning and teaching mathematics: An International perspective*. Psychology Press.
16. Skemp, R. R. (1987) *The Psychology of Learning Mathematics* (2nd Ed.). London: Erlbaum.
17. Steffe. L. P., & Gale, J. (1995). *Constructivism in Education*. Lawrence Erlbaum Associates.
18. Vygotsky, L. (1978) *Mind in Society*, Cambridge, Massachusetts: Harvard University Press.
19. Vygotsky, L. (1986). *Thought and language*. (newly revised and edited by Alex Kozulin). Cambridge: The MIT Press.

Journals

1. Journal for Research in Mathematics Education, NCTM, U.S.A.
2. Journal of Science and Mathematics Education in Southeast Asia, RECSAM, Penang.
3. Mathematics Teaching, Association of Teachers of Mathematics (ATM), England.
4. The Mathematics Teachers, NCTM, U.S.A.
5. Educational Studies in Mathematics.
6. For the learning of mathematics.

LIST OF PROJECT SUPERVISORS (MGM599/8)

BIL.	PROFESSORS	AREAS OF RESEARCH	ROOM NO./ E-MAIL/ EXT.
1.	DATO' ROSIHAN M. ALI BSc Nevada, Reno MSc, PhD TEXAS TECH	Univalent Function Theory, Complex Analysis, Mathematical Education (Hand-held Technology)	Room No. : 129 rosihan@usm.my Ext. No. : 3966
2.	ABD. RAHNI MT. PIAH BA Knox College MSc USM PhD DUNDEE	Approximation Theory, Computer Aided Geometric Design	Room No. : 135 arahni@usm.my Ext. No. : 3945
3.	AHMAD IZANI MD. ISMAIL BSc LONDON MSc READING PhD BRADFORD	Numerical Methods	Room No. : 030 ahmad_izani@usm.my Ext. No. : 3657
4.	HAILIZA KAMARULHAILI BSc USM MSc, PhD LIVERPOOL	Analytical Number Theory, Cryptography	Room No. : 040 hailiza@usm.my Ext. No. : 3648
5.	LOW HENG CHIN BSc, PhD LIVERPOOL	Statistical Theory, Practical Applications of Statistics	Room No. : 037 hclow@usm.my Ext. No. : 3641
6.	MICHAEL KHOO BOON CHONG B.App.Sc, PhD USM	Statistical Process Control, Statistical Inference,	Room No. : 120 mkbc@usm.my Ext. No. : 3941
7.	NORHASHIDAH HJ. MOHD. ALI BSc W.ILLINOIS MSc VIRGINIA TECH PhD UKM	Partial Differential Equations, Parallel Numerical Algorithms	Room No. : 043 shidah_ali@usm.my Ext. No. : 3960
8.	ZARITA ZAINUDDIN BSc Monmouth College ILLINOIS MSc OHIO, PhD USM	Neural Networks Learning Algorithms, Mathematical Modelling	Room No : 044 zarita@usm.my Ext. No. : 3958

BIL.	ASSOCIATE PROFESSORS	AREAS OF RESEARCH	ROOM NO./ E-MAIL/ EXT.
1.	ADAM BAHARUM BSc, MSc W. MICHIGAN	Mathematical Programming, Inventory Control, Reliability and Maintenance Modelling	Room No. : 121 adam@usm.my Ext. No. : 3942
2.	ANDREW RAJAH A/L BALASINGAM GNANARAJ BSc, PhD USM	Algebra, Groups and Moufang Loops	Room No. : 124 andy@usm.my Ext. No. : 4780
3.	JOSHUA IGNATIUS BSc, MSc, Ph.D USM	Business Research Methods, Structural Equations Modeling, Supply Chain Analysis, Industrial Engineering Optimization Processes	Room No. : 133 josh@usm.my Ext. No. : 4769
4.	NOOR ATINAH AHMAD BSc BRISTOL PhD SOUTHAMPTON	Phase Transition, DSP, Mathematical Modelling	Room No. : 027 nooratinah@usm.my Ext. No. : 4767
5.	ONG HONG CHOON B.Sc UM Dip Ed UM MSc, PhD USM	Neural Networks Data Mining	Room No. : 019 hcong@usm.my Ext. No. : 4763
6.	SARATHA A/P SATHASIVAM BSc Ed, MSc USM PhD UM	Neural Networks, Logic	Room No. : 033 saratha@usm.my Ext. No. : 2428
7.	TEH SU YEAN BSc, MSc, PhD USM	Environmental and Ecosystem Modelling, Mathematical Modelling	Room No. : 035 syteh@usm.my Ext. No. : 4770

BIL.	SENIOR LECTURERS	AREAS OF RESEARCH	ROOM NO./ E-MAIL/ EXT.
1.	ADLI MUSTAFA BSc. MSc W. MICHIGAN PhD NUS	Network Flows, Data Envelopment Analysis, Multiple Criteria Decision Modelling	Room No. : 136 adli.mustafa@usm.my Ext. No. : 3968
2.	AHMAD LUTFI AMRI RAMLI BSc USM MSc BRUNEL UNIVERSITY, UK PHD DURHAM, UK	Computer Aided Geometric Design	Room No. : 022 alaramli@usm.my Ext. No. : 2065
3.	ANG MIIN HUEY BA USM, MSc USM. Ph.D NUS	Coding Theory, Cryptography, Algebra	Room No. : 036 mathamh@usm.my Ext. No. : 4772
4.	AZHANA AHMAD BSc, USM, MSc. UKM, PhD UTM	Group Theory	Room No. : 035 azhana@usm.my Ext. No. : 4771
5.	ENA JAMAL BSc, MSc USM	Algebra, Groups and Moufang Loops	Room No. : 034 ena@usm.my Ext. No. : 3658
6.	FAM PEI SHAN BSc, MSc USM PhD UM	Categorical Data Analysis	Room No. : 09 (Kabin B) fpeishan@usm.my Ext. No. : 5908
7.	FARAH AINI ABDULLAH BSc, MSc USM PhD UNIVERSITY OF QUEENSLAND	Mathematical Computing Biomathematics	Room No. : 024 farahaini@usm.my Ext. No. : 4765
8.	HAJAR SULAIMAN BSc BISHOP'S MSc, PhD UMIST	Algebra, Group Theory	Room No. : 122 hajars@usm.my Ext. No. : 4779
9.	HUSNA HASAN BSc IOWA MSc W. MICHIGAN PhD USM	Branching Process, Applied Statistics	Room No. : 026 husnahasan@usm.my Ext. No. : 3969
10.	KONG VOON PANG BSc, MSc, PhD USM	Computer Aided Geometric Design	Room No. : 125 kongvp@usm.my Ext. No. : 3943

BIL.	SENIOR LECTURERS	AREAS OF RESEARCH	ROOM NO./ E-MAIL/ EXT.
11.	LEE SEE KEONG BSc, MSc USM PhD LSU	Stochastic Analysis	Room No. : 111 sklee@usm.my Ext. No. : 2070
12.	MAISARAH HAJI MOHD BSC, MSC USM, PHD UKM	Complex Analysis, Geometric Function Theory	Room No. : 110 maisarah_hjmohd@usm.my Ext. No. : 4488
13.	MOHD. TAHIR ISMAIL B. App. Sc, MSc USM PhD UKM	Financial Time Series	Room No. : 131 m.tahir@usm.my Ext. No. : 2071
14.	NOOR HAYATI MARZUKI BSc MALAYA MSc USM	History of Mathematics	Room No. : 023 nhayatim@usm.my Ext. No. : 2356
15.	NORHASHIDAH AWANG BSc USM, MSc NUS PhD UPM	Spatial Statistics	Room No. : 041 shidah@usm.my Ext. No. : 4774
16.	NORLIDA MOHD. NOOR Ijazah Kepujian ITM MSc USM	Applied Statistics	Room No. : 039 norlida@usm.my Ext. No. : 3958
17.	NUZLINDA ABDUL RAHMAN BSc, MSc USM PhD UKM	Spatial Statistics	Room No. : 126 nuzlinda@usm.my Ext. No. : 4781
18.	ONG WENG ENG BSC, MSC, UM PHD CANTERBURY	Surface Approximation Shortest Path Algorithm	Room No. : 112 weneng@usm.my Ext. No. : 4776
19.	ROSMANJAWATI ABDUL RAHMAN BSc (Ed), MSc UKM PhD USM	Applied Statistics	Room No. :119 rosmanjawati@usm.my Ext. No. : 4778
20.	SEK SIOK KUN B.Econ, MSc UKM PhD Germany	Econometrics	Room No. : 05 (Block L10) sksek@usm.my Ext. No. : 5338
21.	SHAMSUL RIJAL MUHAMMAD SABRI BSc, MSc UKM PhD UM	Applied Statistics	Room No. : 115 rijal@usm.my Ext. No. : 3964

BIL.	SENIOR LECTURERS	AREAS OF RESEARCH	ROOM NO./ E-MAIL/ EXT.
22.	SITI AMIRAH ABD RAHMAN B.SC. UTM M.SC. TECH., PHD UNSW	Discrete Optimisation	Room No. : 020 amirahr@usm.my Ext. No. : 2355
23.	SURAIYA KASSIM BSc IOWA MSc USM	Statistics and Stochastic Process, Applied Statistics	Room No. : 041 suraiya@usm.my Ext. No. : 4773
24.	SYAKILA AHMAD BSc, MSc UKM PhD UPM	Mathematical Modelling, Fluid Dynamics, Convective Heat Transfer	Room No. : 130 syakilaahmad@usm.my Ext. No. : 4782
25.	TAN GUAT YEW BSc, USM, MSc NTU	Computer Graphics	Room No. : 123 tan_gy@usm.my Ext. No. : 3944
26.	TEH WEN CHEAN BSC, MSC, USM PHD OHIO STATE UNIVERSITY, USA	Combinatorics Logic	Room No. : 117 dasmenteh@usm.my Ext. No. : 4777
27.	YAHYA ABU HASAN BSc, MSc, PhD LONDON	Cryptography, Computational Intelligence, Algorithmic Modelling	Room No. : 134 ah.yahya@usm.my Ext. No. : 4783
28.	YAZARIAH MOHD. YATIM BSc, MSc. USM PhD. STRATCHLYDE	Thin-film flows, Newtonian and non- Newtonian fluid mechanics, Travelling wave and similarity solutions	Room No. : 19 KABIN B yazariahmy@usm.my Ext. No. : 3384
29.	ZAINUDIN ARSAD BSc HERIOT-WATT MSc SHEFFIELD PhD HERIOT-WATT	Time Series	Room No. : 036 zainudin.arsad@usm.my Ext. No. : 2069
30.	ZALILA ALI BSc, MSc W. MICHIGAN	Design of Experiments	Room No. : 042 zalita_ali@usm.my Ext. No. : 4775

**GUIDELINES FOR CANDIDATES OF THE MGM599/8 COURSE (PROJECT)
REGISTERED
IN SEMESTER I & II, ACADEMIC SESSION 2015/2016**

Introduction

The **Project report** should be completed within the stipulated time. Candidates who fail to submit the project within the stipulated time will be awarded a Grade F for the whole course and are required to repeat the project on a new topic. This set of guidelines is prepared to provide detailed explanation on the minimum requirements that have to be fulfilled by the candidates as well as the process and the aspects of examination of the project in partial fulfillment of the Master of Science (Teaching of Mathematics) Degree.

Submission of Project

1. Reports may be written either in Bahasa Malaysia or English.
2. Candidates are required to submit 4 copies of the Final Project report (bound in red soft cover) for the purpose of examination together with the Project Submission Form that has been filled by the candidate and signed and approved by his/her supervisor (refer to Appendix B) to the Dean's office on a specified date. The final title and the translation of the project must also be included for confirmation and approval. The project report will not be examined until the candidate fulfills all the requirements.

Format

3. The full project title, the full name of the candidate, School of Mathematical Sciences and the month and year of submission of the project for examination should be typed in capital letters of size 18 on the front cover as shown in the following example:

PROJECT TITLE *(font 18)*

NAME OF CANDIDATE *(font 18)*

MGM599/8 PROJECT REPORT
SCHOOL OF MATHEMATICAL SCIENCES *(font 18)*
UNIVERSITI SAINS MALAYSIA

2016 *(font 18)*

If the Project is written in Bahasa Malaysia, the example is as follows:

TAJUK PROJEK

NAMA CALON

**LAPORAN PROJEK MGM599/8
PUSAT PENGAJIAN SAINS MATEMATIK
UNIVERSITI SAINS MALAYSIA**

2016

4. Every Project comprises four parts: **The Introduction, the Text, the Reference and the Appendix**. Each part has several sections that must be arranged in the correct sequence. The heading of every section must be in capital letters, centralized without any punctuation marks and 5 cm from the top of the page; the text and list begin four spaces below.
5. Only good quality plain white paper (80 g/m²) of A4 size (210 × 297 mm) should be used. Materials must be typed or printed on one side of the paper only using a 'laser printer'. All photocopies must be clear to ensure the quality of printing. Carbon copies are not acceptable. All copies must be clean and legible. The text should be typed, double-spaced using the 'Microsoft Word 2000/Latex' word processor or the latest version.

Candidates are encouraged to use the font, '**Times New Roman**' and the acceptable font size for the whole project is **10-12 points**. **Single-spacing** is recommended for long tables, long quotations, notes, footnotes, multi-line captions and bibliographic entries. No crossing-out of letters or words is permitted. All erased sections must be clean. The use of transparent tape for patching purposes is not allowed.

6. The **Introduction** begins with the Title page as shown in the example below:

<p style="text-align: center;">PROJECT TITLE (<i>font 14</i>)</p> <p style="text-align: center;">by (<i>font 12</i>)</p> <p style="text-align: center;">NAME OF CANDIDATE (<i>font 14</i>)</p> <p style="text-align: center;">Project submitted in partial fulfillment of the requirements for the degree (<i>font 12</i>) of Master of Science (Teaching of Mathematics)</p> <p style="text-align: center;">August 2016 (<i>font 14</i>)</p>

or as follows (if the project is written in Bahasa Malaysia):

<p style="text-align: center;">TAJUK PROJEK</p> <p style="text-align: center;">oleh</p> <p style="text-align: center;">NAMA CALON</p> <p style="text-align: center;">Projek diserahkan untuk memenuhi sebahagian keperluan bagi Ijazah Sarjana Sains Matematik Pengajaran</p> <p style="text-align: center;">Ogos 2016</p>

7. The **Introduction** is made up of a number of sections such as the Title page as above, Acknowledgment, Table of Contents, List of Tables (if any), List of Figures (if any), List of Diagrams (if any), List of Symbols (if any), Abbreviations or Wordlist (if any) and lastly the Abstract. All pages in the Introduction are numbered using lower case Roman numerals (i, ii, iii, etc). The title page of the Project report is considered as page i, but the number is not printed on the page.
8. Consistency in pagination is more important than the position of the page number.

9. An Abstract in both Bahasa Malaysia and English must be provided, the former version appearing before the latter. If the project is written in Bahasa Malaysia, the English version of the Abstract must have an English title and vice-versa. The Abstract is a summary of the entire Project and should provide a brief exposition of the research problems and aims, approaches taken to solve the problems and a summary of findings in the context of the whole area of study. Subsequent research proposals may be incorporated. This section should be double-spaced and the length of each version should not exceed 400 words. The Abstract should be placed immediately before the First Chapter of the Project report.
10. The **Text** is made up of a number of sections **The organisation of this section is to be determined by the student and his/her supervisor(s)**. As a general guideline, the length of the text should not exceed 10,000 words. For example, the **text** can start with an introduction that highlights the problem(s) under investigation by describing the status of the problem(s) conceptually and theoretically. Besides that, the candidate can state the scope and objectives of the study and outline the plan of action or research protocol based on the status of the problem(s). The literature review may be written as a separate chapter and the materials that have been quoted or extracted should be relevant to the research topic, objectives, method or the research protocol and the basic theory or the approach used. The literature review should include the latest research findings from books, journals, magazines, research reports and the latest materials from the internet / websites. The subsequent chapters or sections in the **text** may include research methods, results, discussion, summary or conclusion and recommendations for future research.

11. The standard margins for the general text are as follows:

Top	:	2.5 cm
Right	:	2.5 cm
Left	:	3.5 cm
Bottom	:	2.5 cm

12. The **Bibliography** or **Reference** is a chapter after the **Text** that begins on a fresh page bearing the heading in capital letters, centralized without any punctuation marks, 5 cm from the top. The list of references begins four spaces below the heading, double-spaced between entries but single-spaced within each entry. A 3-space indentation should be used for any entry exceeding a single line. References must be presented according to the Harvard System (refer to Appendix C). If a candidate makes use of other works in his/her project, either in direct quotation or by reference, these sources must be listed in the bibliography. If references have been made but not specifically cited in the text, they should be separately listed as an appendage to the Bibliography and given the subheading **General Reference**.
13. The **Appendix** is a section that is separated from the preceding material by a cover sheet bearing the heading **APPENDICES** in capital letters (or, if there is only one, **APPENDIX**), centralized without any punctuation marks. This sheet is not numbered and also not included in the total number of pages. Appendices present materials that need to be referred to in the text. It contains supplementary illustrative material, notes on interview/questionnaires, data or quotations too long for inclusion in the text or long explanation about a particular method/experiment. Appendices may be divided into Appendix A, Appendix B, etc., such divisions being treated as first order subdivisions. Each appendix with its title, if it has one, should be listed separately in the Table of Contents as a first order subdivision under the heading APPENDICES. Tables and figures in the Appendices must be numbered and captioned and also listed in the List of Tables and List of Figures in the Introduction.

Examination of the Project

14. The supervisor and the Internal Examiner appointed by the Board of the School of Mathematical Sciences will each be given a copy of the project report for examination purposes, to be completed within 3 weeks.
15. Candidates need to hold a seminar on the project that has been submitted for examination. The project report will be evaluated during the viva that will be held on a specific date in the month of **June 2016** at the School of Mathematical Sciences (candidates will be notified of the venue and the time at least two weeks before the viva). The seminar may include the presentation of the research background, framework, hypothesis, findings, discussion and recommendations. Each candidate will be allotted 15 minutes for the presentation and 10 minutes for the question and answer session.
16. The Panel for the Viva comprises the Deputy Dean (Postgraduate Studies & Research), the Chairman of Academic Affairs (Pure Mathematics), the Supervisor and the Internal Examiner.
17. The scope of evaluation of the MGM 599 Course (Project) is as follows:

Evaluation	Percentage (%)
Originality / Authenticity	30
Presentation	40
Literature Review	20
Results / New method	10
Seminar (Viva-Voce)	Pass / Fail

18. The overall evaluation of the project will be based on grades ranging from A to F. The passing grade is **B**.
19. After the viva, candidates have to make all the corrections if any, and submit 2 hard cover “deposit copies” of their reports bound in red buckram or rexine together with the Submission of Final Report Form (refer to Appendix D) which may be obtained from the general office.

APPENDIX A

The Harvard System

Under the Harvard System, reference is made by giving the author's surname together with the year of publication. In the text, the year of publication appears within parenthesis after the author's surname if it forms part of the sentence; for example, Ch'ng (1986) or Salleh and Zainuddin (1987) or where there are more than two authors, Nagendran *et.al* (1990). If several papers by the same author and from the same year are cited, the letters a, b, c, etc. should be placed after the year of publication; for example Karel and Labuza (1988b).

In contrast, both the author's surname and the year of publication appear within brackets if the author's surname does not form part of the sentence; for example: (Omar & Tan, 1989).

In any particular sentence, if several publications are cited, the references should be cited in chronological order. However, if several publications in the same year are cited, the references should be made in alphabetical order and with publications by a single author taking precedence over those by co-authors.

Under the heading Bibliography or Reference, all references are cited in alphabetical order. The references do not need to be numbered. References to periodicals should be listed as follows: authors' surnames and initials (instead of first author *et al.*) year of publication in brackets, exact title of paper, abbreviated title of the periodical in italics (or underlined), volume number in Arabic numerals, underlined twice (or in bold print) and initial and final page numbers of the article. For example:

Kalatos, T. M. & Lee, A. R. (1990). A simple device to illustrate angular momentum conservation and instability. *Am. J. Phys.* **58** (1), 80 – 81.

In the Harvard System, the titles of books are in italics (or underlined), followed by the city and publisher. For example:

Conn, E. E., Stumpf, P. K., Bruening, G. & Doi, R. H. (1987), *Outlines of Biochemistry*, 5th edn. New York: John Wiley & Sons.

Reference from edited books may be written as follows:

Hocking, A. D. (1988). Moulds and yeasts associated with foods of reduced water activity: Ecological Interactions. In *Food Preservation by Moisture Control* (Seow, C. C., ed.), p. 57 – 72. London: Elsevier Applied Sci. Publ.

References from other materials are as follows:

Web page without author

Feminist Collections A Quaterly of Women's Studies Resources (2002) [Online], [Accessed 9th May 2002]. Available from World Wide Web :
http://www.library.wisc.edu/libraries/Womens_Studies/fcmain.htm

Web page with author

Harking, S.(2000) *Profesor Stephen Hawking's website* [Online]. [Accessed 9th May 2002]. Available from World Wide Web :
<Http://www.hawking.org.uk/home/hindex.html>

Thesis

Gill, M.R. (1997) *The relationship between the physical properties of human articular cartilage and tissue biochemistry and ultrastucture*. Ph.D thesis, University of Leeds.

Proceedings/ Conference paper

Robertson, J.(1986) The economics of local recovery : In : *The Other Economics Summit*, 17/18 April 1986, Tokyo. London : The Other Economics Summit.

Electronic journal

Royall C.P., B.L. Thiel & A.M. Donald. (2001) Radiation damage of water ini environmental scanning electron microscopy. *Journal of Microscopy*. [Online]. 2004(3), Accessed 9th May 2002], p. 185. Available from World Wide Web :
<http://www.blackwell-synergy.com/>

CD-ROM

Who's who 1987-1998 electronic resource (1998) [CD-ROM] London : Oxford University Press.

Note:

1. There are various systems of abbreviating titles of periodicals. As a general guideline, students can adopt the system provided in the book "The World List of Scientific periodicals" or refer to their respective supervisors.
2. When listing the references, the titles of articles should be reproduced exactly as they appear in the original.
3. Consistency is the keyword in any system of referencing.



PUSAT PENGAJIAN SAINS

RANCANGAN SARJANA SAINS [MATEMATIK PENGAJARAN]

Sidang Akademik.....

BORANG PENGESAHAN PENYELIA KURSUS PROJEK

Kod Kursus : MGM599/8

Nama Pelajar :

No. K/Pengenalan :

No. Matrik :

E-Mel :

Tandatangan Pelajar :

Tarikh :

Tajuk Projek :

.....

.....

Saya mengesahkan bahawa saya bersetuju untuk menyelia pelajar di atas pada

Sidang Akademik :

Nama Penyelia :

Tandatangan Penyelia :

Tarikh :



RANCANGAN SARJANA SAINS (Mod Kerja Kursus)

BORANG PENYERAHAN PROJEK
(Project Submission Form)

BAHAGIAN A

(Untuk diisi oleh calon)

Kepada : Dekan

Pusat Pengajian Sains Matematik

Universiti Sains Malaysia

11800 Pulau Pinang

Name : _____

No. Matrik : _____

Taraf Pencalonan : **Sambilan/Penuh Masa** (sila tandakan)

Alamat (terkini) : _____

No. Tel. : _____ E-Mel: _____

Tarikh : _____

Bersama-sama ini saya kemukakan **4 naskah projek** dalam bentuk berjilid dengan pembalut yang lembut (berwarna merah) bertajuk:

Terjemahan :-

1. Saya ingin mengesahkan bahawa projek tersebut telahpun disemak oleh Penyelia saya dan komen beliau adalah seperti yang terdapat di Bahagian B borang ini.

Sekian, terima kasih,

(Tandatangan Calon)

BAHAGIAN B

(Untuk diisi oleh Penyelia Utama)

Nama Penyelia : _____

Saya telah menyemak projek Encik/Puan/Cik _____ calon Ijazah Sarjana Sains (Matematik Pengajaran) yang bertajuk:

.....
.....

1. Saya ingin mengesahkan bahawa saya berpuas hati dengan kemajuan yang dicapai oleh calon dan dilihat dari segi kualiti dan mutu bahasa, saya tiada halangan porjek tersebut diserahkan untuk tujuan penilaian.

Sekian, terima kasih.

(Tandatangan Penyelia)

(Tarikh)

BAHAGIAN C

(Untuk diisi oleh Dekan/Timbalan Dekan (Pengajian Siswazah & Penyelidikan)

Saya ingin mengesahkan perakuan yang dibuat oleh Penyelia Projek calon ini seperti yang tercatat di Bahagian B di atas.

(Tandatangan Dekan/Timbalan Dekan)

(Tarikh)



**PUSAT PENGAJIAN SAINS MATEMATIK
SCHOOL OF MATHEMATICAL SCIENCES
BORANG PENYERAHAN PROJEK MUTKHIR
(Kursus MGM599/8)
(Final Project Submission Form)**

BAHAGIAN A

(Untuk diisi oleh calon)

Name : _____

No. Matrik : _____

Alamat (terkini) : _____

No. Tel. : _____ E-Mel: _____

Tarikh : _____

Bersama-sama ini saya kemukakan :-

- i) Dua (2) naskah berjilid dengan pembalut khas disertasi Ijazah Sarjana Sains [**Matematik Pengajaran**] bertajuk :-

Terjemahan :-

- ii) Saya ingin mengesahkan bahawa disertasi tersebut telahpun disemak oleh Penyelia Utama saya dan Dekan Pusat Pengajian, komen mereka adalah seperti yang terdapat pada Bahagian B dan C borang ini.

Sekian, terima kasih,

(Tandatangan Calon)

BAHAGIAN B*(Untuk diisi oleh Penyelian Utama)*

Nama Penyelian : _____

Pusat Pengajian : _____

Saya telah menyemak pembetulan/pindaan yang dilaksanakan oleh Encik/Puan/Cik _____ mengenai projeknya sebagaimana yang dipersetujui oleh Jemaah Pemeriksaan Projek.

1. Saya ingin mengesahkan bahawa saya berpuas hati dengan pembetulan/pindaan yang dilaksanakan oleh calon.

Sekian, terima kasih.

(Tandatangan Penyelia)

(Tarikh)

BAHAGIAN C*(Untuk diisi oleh Dekan Pusat Pengajian)*

Saya _____ Dekan Pusat Pengajian Sains Matematik ingin :-

- (i) Mengesahkan perakuan yang dibuat oleh Penyelia Calon;
- (ii) Mengesahkan bahawa saya berpuashati dengan pembetulan/pindaan yang dilaksanakan oleh calon sebagaimana yang dipersetujui oleh Jemaah Pemeriksaan Projek.

(Tandatangan Dekan)

(Tarikh)