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# **Master of Science Teaching of Mathematics**

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**Academic Session 2023/2024**



**School of Mathematical Sciences**

## CONTENTS

<b>Academic Calendar 2023/2024</b>	3
<b>Important Dates for Full Time Candidates: MGM 599/8 Project Course</b>	4
<b>Important Dates for Part Time Candidates: MGM 599/8 Project Course</b>	5
<b>OBJECTIVES</b>	6
<b>PROGRAMME STRUCTURE</b>	7
<b>COURSES</b>	7
<b>SYNOPSIS OF COMPULSORY COURSES</b>	9
1.0 MGM 502/4 : Number Theory ( <i>Teori Nombor</i> )	9
2.0 MGM 511/4 : Linear Algebra ( <i>Aljabar Linear</i> )	9
3.0 MGM 531/4 : Euclidean Geometry ( <i>Geometri Euklidan</i> )	9
4.0 MGM 551/4 : Operations Research ( <i>Penyelidikan Operasi</i> )	10
5.0 MGM 561/4 : Statistical Methods for Research ( <i>Kaedah Statistik untuk Penyelidikan</i> )	10
6.0 MGM 562/4 : Probability Theory ( <i>Teori Kebarangkalian</i> )	11
7.0 MGM 599/8 : Project ( <i>Projek</i> )	11
<b>SYNOPSIS OF ELECTIVE COURSES</b>	12
1.0 MGM 501/4 : Analysis ( <i>Analisis</i> )	12
2.0 MGM 503/4 : Combinatorics ( <i>Kombinatorik</i> )	12
3.0 MGM 563/4 : Statistical Inference ( <i>Pentaabiran Statistik</i> )	13
4.0 MGM 581/4 : Mathematics and Technology ( <i>Matematik dan Teknologi</i> )	13
5.0 PMC 561/3 : Theories of Teaching and Learning Mathematics ( <i>Teori Pengajaran dan Pembelajaran dalam Matematik</i> )	14
<b>LOCATION</b>	15
<b>GUIDELINES FOR PREPARATION OF PROJECT REPORT (MGM 599/8)</b>	15

## ACADEMIC CALENDAR - ACADEMIC SESSION 2023/2024

## Note:

i. New Coursework/Mixed/Online mode students' registration for Semester 1, 2023/2024 (October 2023) can be completed via online process from 4 September 2023 - 9 October 2023.

ii. New Coursework/Mixed/Online mode students' registration for Semester 2, 2023/2024 (March 2024) can be completed via online process from 16 January 2024 - 18 March 2024.

iii. New Research mode students' registration can be completed anytime.

SEM	WEEKS	ACTIVITY	DATE	REMARKS	
ONE	1	Teaching & Learning (T&L & 7 Weeks)	Monday, 16.10.2023 - Sunday, 22.10.2023		
	2		Monday, 23.10.2023 - Sunday, 29.10.2023		
	3		Monday, 30.10.2023 - Sunday, 05.11.2023		
	4		Monday, 06.11.2023 - Sunday, 12.11.2023	12.11.2023, Sunday - Deepavali**	
	5		Monday, 13.11.2023 - Sunday, 19.11.2023	13.11.2023, Monday - Deepavali (replacement leave)	
	6		Monday, 20.11.2023 - Sunday, 26.11.2023		
	7		Monday, 27.11.2023 - Sunday, 03.12.2023		
	8	Mid Semester Break (1 Week)	Monday, 04.12.2023 - Sunday, 10.12.2023		
	9	Teaching & Learning (T&L & 7 Weeks)	Monday, 11.12.2023 - Sunday, 17.12.2023		
	10		Monday, 18.12.2023 - Sunday, 24.12.2023		
	11		Monday, 25.12.2023 - Sunday, 31.12.2023	25.12.2023, Monday - Christmas	
	12		Monday, 01.01.2024 - Sunday, 07.01.2024	01.01.2024, Monday - New Year of 2024	
	13		Monday, 08.01.2024 - Sunday, 14.01.2024		
	14		Monday, 15.01.2024 - Sunday, 21.01.2024		
	15		Monday, 22.01.2024 - Sunday, 28.01.2024	25.01.2024, Thursday - Thaipusam	
	16	Revision Week (1 Week)	Monday, 29.01.2024 - Sunday, 04.02.2024		
	17	Examination (3 Weeks)	Monday, 05.02.2024 - Sunday, 11.02.2024	10 & 11.02.2024, Saturday & Sunday - Chinese New Year	
	18		Monday, 12.02.2024 - Sunday, 18.02.2024	12.02.2024, Monday - Chinese New Year (replacement leave)	
	19		Monday, 19.02.2024 - Sunday, 25.02.2024		
	20	Mid Semester Break / Industrial Training (4 Weeks)	Monday, 26.02.2024 - Sunday, 03.03.2024		
21	Monday, 04.03.2024 - Sunday, 10.03.2024				
22	Monday, 11.03.2024 - Sunday, 17.03.2024		12.03.2024, Tuesday - Ramadhan		
23	Monday, 18.03.2024 - Sunday, 24.03.2024				
TWO	24/1	Teaching & Learning (T&L & 7 Weeks)	Monday, 25.03.2024 - Sunday, 31.03.2024	28.03.2024, Thursday - Nuzul Al-Quran	
	25/2		Monday, 01.04.2024 - Sunday, 07.04.2024		
	26/3		Monday, 08.04.2024 - Sunday, 14.04.2024	10 & 11.04.2024, Wednesday & Thursday - Eid al-Fitr**	
	27/4		Monday, 15.04.2024 - Sunday, 21.04.2024		
	28/5		Monday, 22.04.2024 - Sunday, 28.04.2024		
	29/6		Monday, 29.04.2024 - Sunday, 05.05.2024	01.05.2024, Wednesday - Labour Day	
	30/7		Monday, 06.05.2024 - Sunday, 12.05.2024		
	31/8	Mid Semester Break (1 Weeks)	Monday, 13.05.2024 - Sunday, 19.05.2024		
	32/9	Teaching & Learning (T&L & 7 Weeks)	Monday, 20.05.2024 - Sunday, 26.05.2024	22.05.2024, Wednesday - Wesak Day	
	33/10		Monday, 27.05.2024 - Sunday, 02.06.2024	30 & 31.05.2024, Thursday & Friday - Pesta Kaamatan	
	34/11		Monday, 03.06.2024 - Sunday, 09.06.2024	01 & 02.06.2024, Saturday & Sunday - Hari Gawai	
	35/12		Monday, 10.06.2024 - Sunday, 16.06.2024	03.06.2024, Monday - YDP Agong's Birthday	
	36/13		Monday, 17.06.2024 - Sunday, 23.06.2024	17.06.2024, Monday - Eid al-Adha**	
	37/14		Monday, 24.06.2024 - Sunday, 30.06.2024	18.06.2024, Tuesday - Eid al-Adha** (replacement leave) (Kelantan)	
	38/15		Monday, 01.07.2024 - Sunday, 07.07.2024	07.07.2024, Sunday - Georgetown World Heritage City Day	
	39/16	Revision Weeks (1 Week)	Monday, 08.07.2024 - Sunday, 14.07.2024	08.07.2024, Monday - Georgetown World Heritage City Day (replacement leave) & Awal Muharram	
	40/17	**Examination (2 Weeks)	Monday, 15.07.2024 - Sunday, 21.07.2024	13.07.2024, Saturday - Penang Governor's Birthday	
	41/18	Examination (3 Weeks)	Monday, 22.07.2024 - Sunday, 28.07.2024		
	42/19		Monday, 29.07.2024 - Sunday, 04.08.2024		
	COURSES DURING LONG BREAK / SEMESTER BREAK		43/20	Long Semester Break / Industrial Training (10/11 Weeks)	Monday, 05.08.2024 - Sunday, 11.08.2024
44/21		Monday, 12.08.2024 - Sunday, 18.08.2024			
45/22		Monday, 19.08.2024 - Sunday, 25.08.2024			
46/23		Monday, 26.08.2024 - Sunday, 01.09.2024	31.08.2024, Saturday - National Day		
47/24		*T&L	Monday, 02.09.2024 - Sunday, 08.09.2024		
48/25		Monday, 09.09.2024 - Sunday, 15.09.2024			
49/26		Examination	Monday, 16.09.2024 - Sunday, 22.09.2024		16.09.2024, Monday - Malaysia Day
50/27		Monday, 23.09.2024 - Sunday, 29.09.2024			
51/28		Monday, 30.09.2024 - Sunday, 06.10.2024			
52/29		Monday, 07.10.2024 - Sunday, 13.10.2024			

**IMPORTANT DATES FOR FULL-TIME CANDIDATES  
MGM599/8 PROJECT COURSE**

**ACADEMIC SESSION 2023/2024**

Candidates submit the **Supervisor Confirmation Form (MGM599)** signed by the supervisor to the General Office, School of Mathematical Sciences by **8<sup>th</sup> January 2024**



Candidates register for MGM599 in Semester Two Academic Session **2023/2024**



Deadline for candidates to submit a project report for examination **on or before the 43<sup>rd</sup> week** of Academic Calendar Academic Session **2023/2024**



Seminar & viva voce will be held on the **45<sup>th</sup> – 47<sup>th</sup> week** of the Academic Calendar Academic Session **2023/2024**

**IMPORTANT DATES FOR PART-TIME CANDIDATES  
MGM599/8 PROJECT COURSE**

**ACADEMIC SESSION 2023/2024**

Candidates submit the **Supervisor Confirmation Form (MGM599)** signed by the supervisor to the General Office, School of Mathematical Sciences by **21<sup>st</sup> July 2024**



Candidates register for MGM599 in Semester One Academic Session **2023/2024**



Deadline for candidates to submit a dissertation for examination **on or before the 43<sup>rd</sup> week** of Academic Calendar Academic Session **2023/2024**



Seminar & viva voce will be held on the **45<sup>th</sup> – 47<sup>th</sup> week** of Academic Calendar Academic Session **2023/2024**

Submission date of supervisor confirmation form for part-time students Academic Session **2022/2023** is by **21<sup>st</sup> July 2024**.

## MASTER OF SCIENCE (TEACHING OF MATHEMATICS)

### A. OBJECTIVES

The objectives of the program are to increase teachers' expertise in teaching mathematics courses at the pre-university level and to nurture research activities among teachers.

#### **Objectives of the Program:**

In line with the mission of the School of Mathematical Sciences (PPSM), the Master of Science (Teaching Mathematics) program offers high-quality mathematics courses with the aim of:

- PEO 1: Demonstrate mastery of knowledge, and adept in problem solving, digital skills and numeracy skills in teaching of mathematics (PO1, PO3, PO10, PO11)
- PEO 2: Capable to solve mathematical problems independently and collaboratively by integrating advanced tools and techniques (PO2, PO5, PO7)
- PEO 3: Exhibit exemplary leadership, proficient organisational skill, effective communication and good ethics in professional and personal enhancement. (PO4, PO6, PO8, PO9)

#### **Program Learning Outcomes:**

- PLO 1 : Evaluate and explain advanced knowledge in mathematics
- PLO 2 : Perform suitable techniques and skills using mathematical and statistical tools to solve problems
- PLO 3 : Formulate solution to complex problems by using logical reasoning, critical thinking and scientific skills
- PLO 4 : Practise effective and efficient communication in both oral and written form.
- PLO 5 : Display effective social skills and teamwork in matters related to assignments and research.
- PLO 6 : Practise good ethics and professionalism at all times
- PLO 7 : Adapt with current skills of lifelong learning for continuous self-improvement.
- PLO 8 : Integrate innovative approach in organising tasks and research activities
- PLO 9 : Display responsibility and exemplary leadership in individual and group work.
- PLO10 : Solve mathematical problems by constructing appropriate solution using digital tools.
- PLO11: Construct appropriate mathematical approaches in providing precise and accurate computational solutions

## B. PROGRAMME STRUCTURE

Coursework students must comply with the following programme structure and graduation requirements:

- Pass all courses, research project and obtain at least a C+ grade; and
- Achieve at least a CGPA of 3.00; and
- Fulfill the minimum duration of candidature; and
- The Bahasa Malaysia 1 (LKM111) is compulsory for all international students. A minimum grade of C must be obtained prior to graduation.

Candidates are also required to participate in seminars organized by the School of Mathematical Sciences from time to time.

The programme is offered either on a full-time or part-time basis. The minimum period for full-time candidates is 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 ( <i>Teori Nombor</i> )
MGM511/4	:	Linear Algebra ( <i>Aljabar Linear</i> )
MGM531/4	:	Euclidean Geometry ( <i>Geometri Euklidian</i> )
MGM551/4	:	Operations Research ( <i>Penyelidikan Operasi</i> )
MGM561/4	:	Statistical Methods for Research ( <i>Kaedah Statistik untuk Penyelidikan</i> )
MGM562/4	:	Probability Theory ( <i>Teori Kebarangkalian</i> )
MGM599/8	:	Project ( <i>Projek</i> )

### Electives (11 or 12 units, choose 3 courses):

MGM501/4	:	Analysis ( <i>Analisis</i> )
MGM503/4	:	Combinatorics ( <i>Kombinatorik</i> )
MGM563/4	:	Statistical Inference ( <i>Pentaabiran Statistik</i> )
MGM581/4	:	Mathematics and Technology ( <i>Matematik dan Teknologi</i> )
PMC561/3	:	Theories of Teaching and Learning Mathematics ( <i>Teori Pengajaran dan Pembelajaran dalam Matematik</i> )

Note:

- Compulsory courses (with the exception of MGM599/8) are offered in every three semesters.
- Elective courses (with the exception of PMC561/3) are offered in every four semesters. (Please refer to the following Table of Course Offering in planning your courses).

**TABLE OF COURSE OFFERING  
(Commencing on 2023/2024 Academic Session)**

		SEMESTER 1		SEMESTER 2	
		Compulsory	Elective	Compulsory	Elective
2023/2024		MGM502/4	MGM581/4	MGM511/4	MGM563/4
		MGM561/4	PMC561/3	MGM562/4	
		MGM 599/8		MGM 599/8	
2024/2025		MGM531/4	MGM503/4	MGM502/4	MGM501/4
		MGM551/4	PMC561/3	MGM561/4	
		MGM599/8		MGM599/8	
2025/2026		MGM511/4	MGM 581/4	MGM 531/4	MGM563/4
		MGM562/4	PMC 561/3	MGM 551/4	
		MGM599/8		MGM 599/8	
2026/2027		MGM502/4	MGM503/4	MGM511/4	MGM501/4
		MGM561/4	PMC561/3	MGM562/4	
		MGM599/8		MGM599/8	

**NOTE:** Apart from MGM599/8, part-time candidates are advised to take 1 compulsory and 1 elective courses in each semester. Apart from MGM599/8 and PMC561/3, 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 he/she could not register for any course in a 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 begin the M.Sc.Teaching of Mathematics programme in the 1<sup>st</sup> semester will normally register for MGM599/8 in their 2<sup>nd</sup> academic year after they have accumulated 12 units, whereas those who begin the programme in the 2<sup>nd</sup> semester may/may not be able to register for



MGM599/8 in the following academic year (since part-time students are advised to take only 8 units of courses per semester). Full-time students who begin the M.Sc.Teaching of Mathematics programme in the 1<sup>st</sup> semester can choose to register for MGM599/8 in the 2<sup>nd</sup> Semester of their 1<sup>st</sup> academic year to achieve a minimum period of candidature; however, this requires them to obtain a supervisor during their 1<sup>st</sup> semester in the programme. Full-time students who begin the M.Sc.Teaching of Mathematics programme in the 2<sup>nd</sup> Semester shall register for MGM599/8 in the following academic year and they can choose either to register in the 1<sup>st</sup> Semester or 2<sup>nd</sup> Semester. Please refer to the synopsis of the course.

## **SYNOPSIS OF COMPULSORY COURSES**

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

Number Theory is the branch of mathematics that studies the structure and nature of numbers and the relationships among them. This course covers the important basics and major concepts such as divisibility, prime number theories, congruences and primitive roots. The use of number theory in cryptography systems will also be discussed in this course.

#### **References**

1. Burton, D. M. (2011). *Elementary Number Theory, 7th Edition*. McGraw-Hill Education.
2. Nota peribadi penyediaan Prof. Dr. Hailiza Kamarulhaili (dengan pembetulan serta penambahbaikan).
3. Rosen, K. H. (2014). *Elementary Number Theory, 6th Edition*. Pearson.
4. Adler, A. and Coury, J. E. (1995). *The Theory of Numbers: A Text and Source Book of Problems*, Jones and Bartlett Publishers.

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

This course emphasizes and critically review the concepts of matrix algebra, system of linear equations, real vector spaces, inner product and inner product space and linear transformations..

#### **References**

1. Anton, H., Rorres, C. & Kaul, A. (2019). *Elementary Linear Algebra, 12th Edition*. John Wiley & Sons.
2. Leon, S. J., (2015). *Linear Algebra with Applications, Global Edition, 9th Edition*. Pearson Education, Inc.
3. Kolman, B. & Hill, D. (2014). *Elementary Linear Algebra with Applications, 9th Edition*. Pearson Education, Inc.
4. Strang, G. (2016). *Introduction to Linear Algebra, 5th Edition*. Wellesley-Cambridge Press.

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

This is an introductory course to Euclidean geometry and transformational geometry. Euclidean geometry will be approached through the Euclid's axioms and problem solving

techniques. It is intended to familiarize the students with the study of points and lines that are invariant under isometries and similarities, as well as many other topics. The properties of Euclidean transformation will also be discussed.

**References**

1. Leonard, I. E., Lewis, J. E., Liu, A. C. F. & Tokarsky, G. W. (2014) *Classical Geometry*. Wiley & Sons.
2. Coxeter, H. S. M. (1967). *Geometry Revisited*. Random House.

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

This course introduces the field of Operations Research. Basic models and their applications are detailed.

Solving methods for some Operations Research problems are taught.

**References**

1. Winston, W.L. (2004). *Operations Research: Applications and Algorithms, 4th Edition*. Cengage Learning,
2. Hillier, F. S. & Lieberman G. J. (2015). *Introduction to Operations Research, 10th Edition*. McGraw-Hill.
3. Taha, H. A. (2017). *Operations Research: An Introduction, 10th Edition*. Pearson.
4. Thomson, Brooks/Cole

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

This course gives a mathematical approach to probability theory. Students are exposed to important concepts in probability theory such as events, independent and exclusive events, Bayes' Theorem, conditional probability, random variable, expectation, variance, moment generating function, Chebyshev's inequality, multivariate variables dan their properties.

**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. (2019). *The Analysis of Time Series: An Introduction with R, 7th Edition*. Chapman & Hall.
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)**

This course gives a mathematical approach to probability theory. Students are exposed to important concepts in probability theory such as events, independent and exclusive events, Bayes' Theorem, conditional probability, random variable, expectation, variance, moment generating function, Chebyshev's inequality, multivariate variables dan their properties.

**References**

1. Ross, S. M. (2019). *Introduction to Probability Models, 12th Edition*. Academic Press.
2. Hogg, R. V., McKean, J. & Craig, A.T. (2018). *Introduction to Mathematical Statistics, 8th Edition*. Pearson.
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*, Universiti Sains Malaysia.

**7.0 MGM599/8 Project (Projek)**

Student will run a project under the supervision of an academic staff. Via the project, the student is able to increase the knowledge in certain topic in mathematics and also enhance his/her skill in reading, talking and writing mathematics.

**PART-TIME STUDENTS**

Students must:

1. Submit the Supervisor Confirmation Form no later than the 1<sup>st</sup> week of the 2<sup>nd</sup> semester's Final Exam.
2. Register for the course in the 1<sup>st</sup> semester of the following Academic Year (students will obtain an incomplete grade in their academic transcript).
3. Submit the report in Aug/Sept towards the end of the 2<sup>nd</sup> Semester (of the same academic year) and complete the seminar and viva voce requirement (date will be announced to the student)
4. Grade will be announced after KSCP (*Kursus Semasa Cuti Panjang*).

**FULL-TIME STUDENTS (Registering MGM599/8 in 1<sup>st</sup> Semester)**

1. Submit the Supervisor Confirmation Form for Project no later than the 1<sup>st</sup> week of the 2<sup>nd</sup> semester's Final Exam.
2. Register for the course in the 1<sup>st</sup> Semester of the following Academic Year.
3. Submit the report and complete the seminar and viva voce requirement before the end of the same semester
4. Grade will be announced concurrently with the 1<sup>st</sup> Semester's course results.

**FULL-TIME STUDENTS (Registering MGM599/8 in 2<sup>nd</sup> Semester)**

1. Submit the Supervisor Confirmation Form for Project no later than the 13<sup>th</sup> week of the 1<sup>st</sup> Semester.

2. Register for the course in the 2<sup>nd</sup> Semester of the same Academic Year.
3. Submit a report in Aug/Sept towards the end of the 2<sup>nd</sup> Semester and complete the seminar and viva-voce requirement (date will be announced to the student)
4. Grade will be announced after KSCP (*Kursus Semasa Cuti Panjang*).

Students who have registered MGM599/8 in any of the academic sessions are required to submit their project report (after confirmation by their respective supervisors) no later than **a date will be announced to the student**. Please note that students are required to submit a research paper from a compilation of their research which is to be appended together with their report. The template for the research paper will be provided via the school's website. The submitted report will be assessed by a committee of examiners and, within 1 – 2 weeks after this date, there will be a seminar presentation (30 mins) followed by viva-voce. The viva-voce session will begin with a short oral presentation by the student regarding his/her project's achievements followed by a question-and-answer session.

Full details of MGM599/8 guidelines are available via <https://math.usm.my/index.php/resources/resources-pg>. All academic staff in the School of Mathematical Sciences can be appointed as Project Supervisor for MGM 599/8 Project Course. List of all academic staffs are available on <https://math.usm.my/index.php/ab/academic-staff>

## SYNOPSIS OF ELECTIVE COURSES

### 1.0 MGM501/4 Analysis (*Analisis*)

This course is designed to bridge the calculus course with rigorous mathematics courses, with plenty of theorems and proofs. This theory of analysis that stemmed from the calculus is meant to enhance and to strengthen student's comprehension, as well as to enable them to see analysis as a unification of proposed ideas.

#### References

1. Wade, W. R. Wade (2014). *Introduction to Analysis, Fourth Edition*. Pearson.
2. Ross, K. A. (2013). *Elementary Analysis: The Theory of Calculus, 2nd Edition*. Springer-Verlag.
3. Rosihan M. Ali & Ong Boon Hua (1999). *Pengantar Analisis*, Penerbit USM
4. William C. Bauldry (2009). *Introduction to Real Analysis: An Educational Approach* Wiley

### 2.0 MGM503/4 Combinatorics (*Kombinatorik*)

This course introduces students to the fundamental techniques of enumeration and various combinatorial objects. The topics include the basic counting principles, the combinatorial structures of permutations and combinations, binomial and multinomial theorems, recurrence relations, generating functions and the principle of inclusion-exclusion. Some applications of combinatorics will also be discussed.

## References

1. Niven, I (2012). *Mathematics of Choice: How to count without counting* (Online Publication), Mathematical Association of America.
2. Bogart, K. P. (1988). *Discrete Mathematics (College)*, D. C. Heath & Co., Lexington.
3. Ya. Vilenking, N. (1971). *Combinatorics*, Academic Press.
4. Grimaldi, R. P (2003). *Discrete and Combinatorial Mathematics: An Applied Introduction, 5th Edition*. Addison-Wesley.

### 3.0 MGM 563/4 Statistical Inference (*Pentaabiran Statistik*)

This course exposes the students to important concepts in statistical inference such as sampling distribution, estimation theory and hypothesis testing.

## References

1. Hogg, R. V., McKean, J. & Craig, A. T. (2019). *Introduction to Mathematical Statistics, 8th Edition*. Pearson.
2. Ross, S. (2019). *A First Course in Probability, 10th edition*. Prentice Hall, New Jersey.
3. Hogg, R.V., Tanis, E. A. & Zimmerman, D. L. (2019). *Probability and Statistical Inference, 10th edition*. Pearson.
4. Larsen, R. J. & Marx, M. L. (2012). *An Introduction to Mathematical Statistics and Its Applications, 5th Edition*. Pearson.

### 4.0 MGM 581/4 Mathematics and Technology (*Matematik dan Teknologi*)

This course introduces students to technologies that can be applied in the teaching and learning of mathematics such as computer softwares, internet applications and mobile technology. Students will explore topics in algebra, calculus, differential equations, statistics and others.

## References

1. 2021/2022 Course Handouts (Assignment Notes, Lab Activity Sheets)
2. Website of Texas Instruments Education Technology: <http://education.ti.com>.
3. Wolfram, S. (2003). *The Mathematica Book, 5th Edition*. Wolfram Media, Inc.
4. Gilat, A. (2015). *MATLAB: An Introduction with Applications, 5th Edition*. John Wiley & Sons.
5. Stewart, J., Clegg, D. K. & Watson, S. (2020). *Calculus, 9th Edition*, Cengage Learning.
6. Hunt, B. R, Lipsman, R. L., Osborn, J. E., Outing, D. A. and Rosenberg, J. (2009) *Differential Equations with Mathematica, Third Edition*, John Wiley & Sons.
7. Ali, R. M., Kassim, S. & Seth, D. L. (2011). *Explorations with a Graphing Calculator*. Penerbit Universiti Sains Malaysia.

## 5.0 PMC 561/3 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, as well as the implications of these theories on the teaching and learning of mathematics in schools. The course syllabus includes: Cognitive theories in the mathematics learning such as Behaviorism, Constructivism, Radical Constructivism, social constructivism including the works of Dienes, Bruner, Piaget, Skemp, von Glasserfield and Vygotsky; Information processing theory; Representation and Visualization in mathematics; and van Hiele theory. Implications of learning theories toward the teaching of mathematics in schools, and research in mathematics education will also be discussed.

### References:

- Bruner, J. S. & Haste, H. (Eds.) (2010). *Making Sense*. London: Routledge Revivals.
- Dienes Z. P. (1964). *The Power of Mathematics*, Hutchinson Educational.
- Dienes, Z. P. (1960). *Building up Mathematics*. Hutchinson Educational.
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**D. LOCATION**

Teaching of Mathematics programme is offered at two locations

- Penang Campus
- Kuala Lumpur Campus

Penang Campus : School of Mathematical Sciences  
Universiti Sains Malaysia, 11800 USM Pulau Pinang

Kuala Lumpur Campus : Level 20, MoF Inc. Tower, Platinum Park,  
No. 9 Persiaran KLCC, 50088 Kuala Lumpur

For more information on USM campus in Kuala Lumpur, please visit USM@KL at  
<https://www.usm.my/campuses/usm-kl>

**E. GUIDELINES FOR PREPARATION PROJECT REPORT (MGM599/8)**

The complete guidelines for preparation of the project report , please refer to the  
<https://math.usm.my/index.php/resources/resources-pg>

***Examination of the Project***

1. The supervisor and the internal examiner appointed by the school board will be given a copy of the Project Report for examination purposes and to be completed within 2 weeks.
2. Candidates need to present a seminar on the Project that has been submitted for examination. The Project Report will be evaluated during the viva-voce sessions. It will be held on a specific date that will be informed later at the School of Mathematical Sciences (candidates will be notified the venue and the time two weeks before the viva). The seminar includes the presentation of the research background, framework, hypothesis, findings, discussion and recommendations. Each candidate will be allocated 15 minutes for the presentation and 10 minutes for the question-and-answer session.
3. The Panel for the viva-voce comprised by the Deputy Dean (Research, Innovation & Industry-Community Engagement), the Chairman of Academic Affairs (Pure Mathematics), the Supervisor and the Internal Examiner.
4. Candidates are required to do all the corrections as specified by the viva-voce panel within the time frame given. All the reports need to be submitted with **two (2)** copies of hard cover bound in red buckram or rexine together with Final Project Submission Form (MGM599) which can be obtained from the School of Mathematical Sciences website (<https://math.usm.my/index.php/resources/resources-pg>)