FIT1034
Principles of computer graphics

Unit Guide

October Intake, 2015

The information contained in this unit guide is correct at time of publication. The University has the right to change any of the elements contained in this document at any time.

Last updated: 21 Sep 2015

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FIT1034 Principles of computer graphics - October Intake, 2015

This unit will introduce students to the underlying principles of computer graphics in games. Relevant mathematics will be covered, with focus on vectors and matrices. This theory will be placed into the games context and put into practice in a game engine environment. This will provide a foundation for the manipulation of graphics and content in future games programming classes and development.

Mode of Delivery

Malaysia (Day)

Workload Requirements

Minimum total expected workload equals 12 hours per week comprising:

(a.) Contact hours for on-campus students:

- Two hours of lectures
- One 2-hour tutorial

(b.) Additional requirements (all students):

- A minimum of 8 hours of personal study per week for completing lab and project work, private study and revision.

See also Unit timetable information

Chief Examiner

Mr Derrick Martin

Campus Lecturer

Malaysia

Leong Kuan Yew

Consultation hours: Consultation hours will be provided in lecture 1

Tutors

Malaysia

Leong Kuan Yew

Consultation hours: Consultation hours will be provided in lecture 1

Your feedback to Us

Monash is committed to excellence in education and regularly seeks feedback from students, employers and staff. One of the key formal ways students have to provide feedback is through the Student Evaluation of Teaching and Units (SETU) survey. The University's student evaluation policy requires that every unit is evaluated each year. Students are strongly encouraged to complete the surveys. The feedback is anonymous and provides the Faculty with evidence of aspects that students are satisfied and areas for improvement.

For more information on Monash's educational strategy, see:

www.monash.edu.au/about/monash-directions/ and on student evaluations, see:
www.policy.monash.edu/policy-bank/academic/education/quality/student-evaluation-policy.html

Previous Student Evaluations of this Unit

Previous feedback has highlighted that one of the main strengths of the unit is that it is a good blend of theoretical concept and also coding examples. This will be continued and improved through more examples this semester. Students have also indicated that the portfolio nature of the assessment items, as well as the semester test all worked well. As a consequence the nature of assessment will remain the same.

Students feedback also informed some improvements to the unit. More feedback was requested before the end of semester, which will be provided through detailed feedback on two assignments as well as the unit test.

If you wish to view how previous students rated this unit, please go to
https://emuapps.monash.edu.au/unitevaluations/index.jsp

Academic Overview

Learning Outcomes

Upon successful completion of this unit, students should be able to:

- describe the geometric meaning behind vectors and be able to solve mathematical problems using their relevant operations;
- describe the geometric meaning behind matrices, Euler angles and quaternions, and be able to solve mathematical problems using their relevant operations;
- demonstrate how these mathematical principles are used in computer game functions, such as player movement, cameras and collisions;
- demonstrate the ability to implement these principles practically in game programming.

Unit Schedule

Week	Activities	Assessment
0		No formal assessment or activities are undertaken in week 0
1	Unit Overview,the Cartesian Coordinate System and Multiple Coordinate Spaces (Ch. 1,3)	
2	An Intro to Vectors and Vector Operations (Ch. 2)	
3	Vectors in Practice (Ch. 2)	
4	An Introduction to Matrices (Ch. 4)	Lab Portfolio Submission 1 (Vectors) due Friday, 3pm in Week 4
5	Matrices and Linear Transformations (Ch. 5)	
6	Further Operations on Matrices (Ch. 6)	
7	Matrices in Practice (Ch. 6)	
8	Orientation and Angular Displacement (Ch. 8)	Lab Portfolio Submission 2 (Matrices) due Friday, 3pm in Week 8
9	Transformations in Practice	
10	Movement and Collisions (Ch. 9 & Appendix A)	
11	Cameras and Case Study (Ch. 10)	
12	Revision	Lab Portfolio Submission 3 (Game Math) and PseudoCode Portfolio due Friday 3pm in Week 12
	SWOT VAC	No formal assessment is undertaken in SWOT VAC
	Examination period	LINK to Assessment Policy: http://policy.monash.edu.au/policy-bank/academic/education/assessment/assessment-in-coursework-policy.html

*Unit Schedule details will be maintained and communicated to you via your learning system.

Teaching Approach

Lecture and tutorials or problem classes

This teaching and learning approach provides facilitated learning, practical exploration and peer learning. While classes will be run in Computer Laboratories to facilitate practical application in a game environment, concepts will also be discussed and worked through in a collaborative group context.

Assessment Summary

Examination (3 hours): 60%; In-semester assessment: 40%

Assessment Task	Value	Due Date
Lab Portfolio Submission 1	5%	Friday, 3pm in Week 4
Lab Portfolio Submission 2	10%	Friday, 3pm in Week 8

Unit Schedule

Lab Portfolio Submission 3	15%	Friday, 3pm in Week 12
Unit Test	10% (1% per test)	During lecture time (Week 2 to Week 11)
Examination 1	60%	To be advised

Assessment Requirements

Assessment Policy

Faculty Policy - Unit Assessment Hurdles
(http://intranet.monash.edu.au/infotech/resources/staff/edgov/policies/assessment-examinations/assessment-hurd

Academic Integrity - Please see resources and tutorials at
http://www.monash.edu/library/skills/resources/tutorials/academic-integrity/

Assessment Tasks

Participation

- **Assessment task 1**

  Title:
  Lab Portfolio Submission 1
  Description:
  This task comprises the first submission of your laboratory portfolio.

  Students will be required to compile a portfolio of major laboratory tasks for submission for assessment. Details of each portfolio component are clearly indicated in the laboratory tasks for each week.

  This submission contains the weekly folio tasks of weeks 2 and 3, which focus on the use of Vectors.

  Learning Outcome: Students will be able to describe the geometric meaning behind vectors and be able to solve mathematical problems using their relevant operations
  Weighting:
  5%
  Criteria for assessment:
  Specific criteria for assessment will be provided on the unit website. However the portfolio work will be judged on the following broad critera:

  - ♦ Being able to recognise when to use particular mathematical functions, and choosing the correct approach
  - ♦ Correctness of process through demonstration of workings
  - ♦ Correctness of the end result

  Late assignments will incur a 5% penalty per late day (including weekends), and may be submitted up to a maximum of 7 days late. After this time submissions will not be accepted without prior arrangement with the unit leader.
  Due date:
  Friday, 3pm in Week 4

Assessment Requirements

- **Assessment task 2**

  Title:
  Lab Portfolio Submission 2

  Description:
  This task comprises the second submission of your laboratory portfolio.

  Students will be required to compile a portfolio of major laboratory tasks for submission for assessment. Details of each portfolio component are clearly indicated in the laboratory tasks for each week.

  This submission contains the weekly folio tasks of weeks 5-7, which focus on the use of Matrices.

  Learning Outcome: Students will be able to describe the geometric meaning behind matrices, Euler angles and quaternions, and be able to solve mathematical problems using their relevant operations

  Weighting:
  10%

  Criteria for assessment:
  Specific criteria for assessment will be provided on the unit website. However the portfolio work will be judged on the following broad critera:

    - Being able to recognise when to use particular mathematical functions, and choosing the correct approach
    - Correctness of process through demonstration of workings
    - Correctness of the end result

  Late assignments will incur a 5% penalty per late day (including weekends), and may be submitted up to a maximum of 7 days late. After this time submissions will not be accepted without prior arrangement with the unit leader.

  Due date:
  Friday, 3pm in Week 8

- **Assessment task 3**

  Title:
  Lab Portfolio Submission 3

  Description:
  This task comprises the third submission of your laboratory portfolio.

  Students will be required to compile a portfolio of major laboratory tasks for submission for assessment. Details of each portfolio component are clearly indicated in the laboratory tasks for each week.

  This submission contains the weekly folio tasks of weeks 9-11, which focus on practical application of vector and matrix principles in game design and development, using pseudocode to show understanding of these principles in a programming environment.

  Learning Outcome: Students will be able to

    - demonstrate how vector and matrix mathematical principles are used in computer game functions, such as player movement, cameras and collisions

   ♦demonstrate the ability to implement these principles practically in game
   programming using pseudocode

Weighting:
  15%
Criteria for assessment:
  Specific criteria for assessment will be provided on the unit website. Feedback will be
  provided on your progress to facilitate for improvements for your exam
  preparation. However the portfolio work will be judged on the following broad critera:

   ♦Being able to recognise when to use particular mathematical functions, and
   choosing the correct approach
   ♦Correctness of process through demonstration of workings
   ♦Correctness of the end result
   ♦Being able to correctly apply the mathematical concepts to game code scenarios
   ♦Creating functionally correct pseudocode

  Late assignments will incur a 5% penalty per late day (including weekends), and may be
  submitted up to a maximum of 7 days late. After this time submissions will not be
  accepted without prior arrangement with the unit leader.
Due date:
  Friday, 3pm in Week 12

- **Assessment task 4**

 Title:
  Unit Test
 Description:
  An in-class unit test will be held at the start of each weekly lecture from Week 2 to Week
  11, covering content from that lecture. This test will be of 10 minute duration and is
  essential in gauging your understanding of fundamental vectors and matrices concepts.

  Learning Outcome:

  Upon successful completion of all of the in-class tests, students should be able to:

   ♦describe the geometric meaning behind vectors and be able to solve mathematical
   problems using their relevant operations;
   ♦describe the geometric meaning behind matrices, Euler angles and quaternions,
   and be able to solve mathematical problems using their relevant operations;
   ♦demonstrate how these mathematical principles are used in computer game
   functions, such as player movement, cameras and collisions;
   ♦demonstrate the ability to implement these principles practically in game
   pseudocode programming.
 Weighting:
  10% (1% per test)
 Criteria for assessment:
  Specific detail will be provided in the lecture each week. Feedback will be provided on
  your progress to facilitate for improvements for your exam preparation.

  The test will be conducted in class. Students will not be permitted to sit the test at another
  time without formal Special Consideration forms submitted and approved by the chief
  examiner.
 Due date:
  During lecture time (Week 2 to Week 11)

Examinations

- **Examination 1**

   Weighting:
   > 60%

   Length:
   > 3 hours

   Type (open/closed book):
   > Closed book

   Electronic devices allowed in the exam:
   > A calculator will be allowed for this examination.

   Remarks:
   > Previous exam is also available through the Library Exams Database. Full exam revision will be covered in Week 12.

Learning resources

Monash Library Unit Reading List (if applicable to the unit)
http://readinglists.lib.monash.edu/index.html

Feedback to you

Types of feedback you can expect to receive in this unit are:

- Informal feedback on progress in labs/tutes
- Graded assignments with comments
- Test results and feedback
- Solutions to tutes, labs and assignments

Extensions and penalties

Submission must be made by the due date otherwise penalties will be enforced.

You must negotiate any extensions formally with your campus unit leader via the in-semester special consideration process: http://www.monash.edu.au/exams/special-consideration.html

Returning assignments

Students can expect assignments to be returned within two weeks of the submission date or after receipt, whichever is later.

Resubmission of assignments

Students may resubmit assignments after the due date has passed (up to a maximum of 7 days). However, there will be a 5% penalty per day for late submissions.

Assignment submission

It is a University requirement (http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-academic-integrity-managing-pla for students to submit an assignment coversheet for each assessment item. Faculty Assignment coversheets can be found at http://www.infotech.monash.edu.au/resources/student/forms/. Please check with your Lecturer on the submission method for your assignment coversheet (e.g. attach a file to the online assignment submission, hand-in a hard copy, or use an electronic submission). Please note that it is your responsibility to retain copies of your assessments.

Online submission

If Electronic Submission has been approved for your unit, please submit your work via the learning system for this unit, which you can access via links in the my.monash portal.

Prescribed text(s)

Limited copies of prescribed texts are available for you to borrow in the library.

Dunn and Parberry. (2011). *3D Math Primer for Graphics and Game Development*. (2nd Edition) Wordware.

Technological Requirements

Student will be expected to check Moodle regularly for announcements and information.

Recommended Resources

While the text listed is not mandatory and required resources will be made available on the unit website, this text will prove a valuable resource for your study. The text will be available in print form through the Caulfield Bookshop, and is also available at a reduced price in digital form through Amazon.com, and an online version is available through the Monash University library.

The Unity development environments will be used in the laboratory classes to place the theoretical game math principles we cover into their appropriate practical context. While it is not essential that students have this development tool, it can help in unit revision. Unity is available free of charge via http://unity3d.com/unity/download

Examination material or equipment

Please refer to the unit website for more information regarding the final examination.

Other Information

Policies

Monash has educational policies, procedures and guidelines, which are designed to ensure that staff and students are aware of the University's academic standards, and to provide advice on how they might uphold them. You can find Monash's Education Policies at:
www.policy.monash.edu.au/policy-bank/academic/education/index.html

Faculty resources and policies

Important student resources including Faculty policies are located at
http://intranet.monash.edu.au/infotech/resources/students/

Graduate Attributes Policy

http://www.policy.monash.edu/policy-bank/academic/education/management/monash-graduate-attributes-policy.h

Student Charter

www.opq.monash.edu.au/ep/student-charter/monash-university-student-charter.html

Student services

The University provides many different kinds of support services for you. Contact your tutor if you need advice and see the range of services available at http://www.monash.edu.au/students. For Malaysia see http://www.monash.edu.my/Student-services, and for South Africa see http://www.monash.ac.za/current/.

Monash University Library

The Monash University Library provides a range of services, resources and programs that enable you to save time and be more effective in your learning and research. Go to www.lib.monash.edu.au or the library tab in my.monash portal for more information. At Malaysia, visit the Library and Learning Commons at http://www.lib.monash.edu.my/. At South Africa visit http://www.lib.monash.ac.za/.

Disability Liaison Unit

Students who have a disability or medical condition are welcome to contact the Disability Liaison Unit to discuss academic support services. Disability Liaison Officers (DLOs) visit all Victorian campuses on a regular basis.

- Website: http://www.monash.edu/equity-diversity/disability/index.html
- Telephone: 03 9905 5704 to book an appointment with a DLO; or contact the Student Advisor, Student Commuity Services at 03 55146018 at Malaysia
- Email: dlu@monash.edu
- Drop In: Equity and Diversity Centre, Level 1, Building 55, Clayton Campus, or Student Community Services Department, Level 2, Building 2, Monash University, Malaysia Campus