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| Hibernia College Planning Form |
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**Session Planning Form**

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| Tutor name: | Kevin O’Brien | | | |
| Delivery date: |  | | | |
| Module title:   |  | | --- | |  | | Mathematics for Computing | | | |
| Session title: | Digraphs and Relatiomns | | **Session no.** | 6 |
| Prepare | | | | |
| Session study content: | Chapter 6 of study guide ( i.e. Chapter 1 of volume 2) | | | |
| Essential readings: | This exercise requires a full understanding of material covered in this chapter. (i.e. Chapter 1 of Study Guide 2) | | | |
| Study aims and learning outcomes: | The quiz/knowledge check questions should focus on determining how well the students succeeded in achieving the study aims and learning outcomes. | | | |
| In this part of the session, students will study the relevant chapter(s) in the University of London study guide and read the essential readings for the chapter(s). When they have completed this, they will complete the end-of-session quiz to see how well they know the session content.  If there are any further readings, resources or web sites that you feel would be useful to students for studying this session, please add them in the next row. | | | | |
| Additional resources | None | None | | |
| Test yourself | Provide multiple-choice questions that test students on the core session content.  Fill in the quiz template at the end of this document with questions and constructive feedback. | | | |
| Evaluate | | | | |
| In this part of the session, students will engage with tasks and activities that will enable them to evaluate and analyse the session content they have studied.  When developing tasks and activities, think about how you intend for the student to achieve each one – this may be through discussing concepts on a forum, contributing to a wiki , conducting some online research, analysing a case study, studying a video, etc.  Discuss your ideas with the Knowledge Officer who will know the full range of options available and advise on which is most appropriate.  Note: You do not need to provide a task for each of the headings below. The task that you provide will depend on the session content and the workload for the student in that session. Select the most appropriate task(s) based on the session content. | | | | |
| Discuss | ~~Provide a question based on the session content that will generate a discussion on the tutor-moderated forum.~~ | | | |
| Solve | Design a problem-solving exercise or worksheet based on the session content that the students will complete. | | | |
| Research | ~~Ask the student to conduct online research into important areas of the session content such as useful examples or further explanation of the content. The findings could then be shared on a forum/wiki/blog.~~ | | | |
| Assess | | | | |
| Note: The activities in this part of the session will be linked to the synchronous online tutorial and the onsite days. The activities for each session will depend on the scheduling of the tutorials and onsites in the module calendar. These activities will be completed over a number of sessions.  Ideally, the activities in this part of the session should link together and be developed over a number of sessions. | | | | |
| Submit | Prepare an activity/task (for example, answering exam questions) for the students and ask them to submit their responses to the tutor prior to an online tutorial or onsite – this submission could then form the basis of the tutorial/onsite discussion.  The activity/task should be based on the content that they have covered in the sessions prior to the online tutorial or onsite. | | | |
| ***Students attempt end of chapter revision questions from the study guide*** | | | |
| Apply your knowledge | In the online tutorial and onsite day, build on the activity/task that students have prepared and submitted. Students could work together in groups to discuss and solve a problem.  A selection of students should be asked to present their submission in each online tutorial or onsite. This would be a different group of students for each tutorials and onsite so every student gets an opportunity to present. | | | |
| ***Not applicable*** | | | |

## Quiz template

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| Session title: | Digraphs and Relations | | Session no. | 6 |
| Test yourself:  Each session should have a minimum of 20 questions in total.  What content is tested will depend on the chapter(s) content – some parts may require more questions than others to test the student.  These questions will be used to test students' knowledge and help them to recall the academic content of the chapter(s).  Constructive feedback should be provided for each question to reinforce the learning for the session. | | | | |
| Q 1: A graph in which every edge has a direction assigned to it is called a directed graph (or digraph for short)  a) True b) False | | Q 2: For a digraph an adjacency matrix must be symmetric.  a) True b) False | | |
| Feedback:  TRUE | | Feedback:  False**:** It does not have to be symmetric. | | |
| Q 3:   We define the outdegree of a vertex u as the number of arcs directed towards vertex u.  a) True  b) False | | Q 4: If a Digraph contains vertices for which every pair of vertices x and y is joined by two directed paths connecting those vertices ( i.e. one from x to y and one from y to x.  a) True  b) False | | |
| Feedback:  FALSE This description corresponds to the indegree. The answer would be correct if it specified arcs going away from vertex u. | | Feedback:  TRUE | | |
| Q 5:  The number of arcs in digraph D is equal to the sum of the entries in the corresponding adjacency matrix.  a) True  b) False | | Q 6:  Let R be an equivalence relation on S.  Two elements of S are related if and only if they belong to the different classes.  a) True  b) False | | |
| Feedback: True | | Feedback: False | | |
| Q7. R is a relation deﬁned on S in precisely the following cases:  *bRb; bRc; cRb; cRc; cRd; dRa.*    The relation R is not reﬂexive. Which minimal set of pairs should be added to R to make it reflexive?   1. dRc and aRd 2. dRd and aRa 3. cRa and bRa 4. cRa and dRb | | Q8. R is a relation deﬁned on S in precisely the following cases:  ***bRb; bRc; cRb; cRc; cRd; dRa.***  The relation R is not symmetric. Which minimal set of pairs should be added to R to make it symmetric?   1. dRc and aRd 2. dRd and aRa 3. cRa and bRa 4. cRa and dRb | | |
| Feedback: The correct answer is b) dRd and aRa | | Feedback: The correct answer is a) dRc and aRd | | |
| Q9. R is a relation deﬁned on S in precisely the following cases:  bRb; bRc; cRb; cRc; cRd; dRa.  The relation R is not transitive. Which minimal set of pairs should be added to R to make it transitive?   1. bRd and cRa 2. dRd and aRa 3. cRa and bRa 4. cRa and dRb | | Q 10 R is a relation deﬁned on S in precisely the following cases:  ***bRb; bRc; cRb; cRc; cRd; dRa.***  Is the relation R anti-symmetric?  YES  NO | | |
| Feedback: The correct answer is a) bRd and cRa | | Feedback:  YES. There are directed cycles of length 2. | | |
| Q 11  Let S = {a, b, c}. State whether or not the following statement is true for any relation R on S  R is reﬂexive if aRa and bRb.  a) True  b) False | | Q12  Let S = {a, b, c}. State whether or not the following statement is true for any relation R on S  If R is symmetric then aRb and bRa.  a) True  b) False | | |
| Feedback: FALSE | | Feedback: FALSE | | |
| Q13. Let S = {a, b, c}. State whether or not the following statement is true for any relation R on S.  If R may be both symmetric and anti-symmetric.  a) True  b) False | | Q 14: Let S = {a, b, c}. State whether or not the following statement is true for any relation R on S.  If R is not an equivalence relation then it is a partial order.  **a) True**  **b) False** | | |
| Feedback: TRUE | | Feedback: FALSE – It may be neither | | |
| Q 15: Let R be an equivalence relation on S.  The set of distinct equivalence classes on R on S is a partition of S.  a) True  b) False | | Q 16 :  Consider a set S ={0,1,2,3,4,5}.  R is the relation such that xRy if x-y is even, for all x and y \in \!\, S. R is symmetric?  a) True  b) False | | |
| Feedback: True | | Feedback: TRUE | | |
| Q 17: Consider a set S ={0,1,2,3,4,5}. R is the relation such that xRy if x-y is even, for all x and y \in \!\, S. R is reflexive?  a) True  b) False | | Q 18: A relation R on a set S is a partial order if it is reflexive, symmetric and anti-transitive.  a) True  b) False | | |
| The correct answer is A) True. | | The correct answer is B) False  reflexive, anti-symmetric and transitive. | | |
| Q 19: Consider a set S ={0,1,2,3,4,5}. R is the relation such that xRy if x-y =2 for all x and y \in \!\, S.  R is reflexive?  a) True  b) False | | Q 20 Consider a set A ={p,q,r,s}. and a set B = {w,x,y,z}.  The cartesian product of A and B can therefore be given as  ***{(p,w),(q,x),(r,y),(s,z)}.***  **a) True**  **b) False** | | |
| The correct answer is B) FALSE | | Feedback: FALSE | | |