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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: | Counting and Probability | | **Session no.** | 9 |
| Prepare | | | | |
| Session study content: | Chapter 3 of study guide 2. | | | |
| Essential readings: | This exercise requires a full understanding of material covered in “Counting and Probability” (Chapter 4 of Book 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: | Counting and Probability | Session no. | 9 |
| 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. | | | |

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| Question 1  There are 2n different n-bit binary strings  A)True  B) False | Question 2  Evaluate the following factorial term 4!  A) 4  B) 24  c) 10  D) 16 |
| Feedback The correct answer: TRUE  See Theorem 4.1 in study guide | Feedback The correct answer is B  4! = 4 x 3 x 2 x 1 =24 |
| Question 3  Evaluate the following factorial term 0!  A) 1  B) 0  C) infinity  D) not mathematically defined | Question 4  Evaluate the binomial coefficient  A) 2.5  B) 10  C) 15  D)20 |
| Feedback The correct answer is A)  0! = 1. | Feedback The correct answer is D  =20. |
| Question 5  How many ways are there of choosing 2 people from a group of six?  A) 3  B) 12  c) 15  D) 36 | Question 6  How many ways are there of making an ordered list of 6 distinct elements, when repetition is not permitted?  A) 6  B) 36  C) 6!  D) 66 |
| Feedback The correct answer is C)  There are 15 ways | The correct answer is C) 6! |
| Question 7  Do the two following binomial coefficients the same value?  =   1. Yes they do 2. No they do not | Question 8  Find the cardinality of the union of sets  Let A={1,2,3,6}  Let B={0,4,5,6}  Answer  A) 6  B) 7  C) 8  D) 9 |
| Answer A) Yes they do. Both are equal to 6 | Correct Answer B  The correct answer is 7. See page 59 and 60 of study guide. |
| Question 9 The number of ordered lists of r elements chosen from n items  What is number of ordered lists of 7 distinct items chosen from a set of 10 distinct elements.   1. 70 2. 720 3. 640 4. 17 | Question 10  A fair coin is flipped 4 times.  How many distinct possible outcomes are there?  (N.B. an example of an outcome would be {H,T,H,T})  A) 4  B) 8  C) 16  D) 64 |
| Feeback  The correct answer is B (10!/7!) = 720 | The correct answer is C) 16 |
| Question 11  From a restaurant's set evening menu, there are three starters, five main courses and three desserts.  Suppose a customer orders an item for course. How many ways are there of making an order.  A) 11  B) 15  C) 45  D) 60 | Question 12  Consider all re-arrangements of the words COMPUTER.  How many rearrangements are possible?  A) 84  B) 8x7x6  C) 7!  D) 8! |
| The Correct Answer is C) 45 | The correct answer is D) 8! |
| Question 13  Consider all re-arrangements of the words COMPUTER.  How many rearrangements contain the substring COMP?  A) 8!-4!  B)8x7x6x5  C) 5!  D) 8! | Question 14  Consider a coin toss experiment where a coin is flipped three times, with the number of heads was recorded.  What is the sample Space of three flips of a coin   1. {HHH,HHT,HTH,HTT,THH,THT,TTH,TTT} 2. {H,T} 3. {0,1,2,3} 4. { {H,T} ,{0,1,2,3} } |
| The correct answer is C)5! | Feedback : The correct answer is C) It is the number of heads that we are interested in. |
| Question 15  Suppose you throw a die twice, noting the number obtained on each throw.  You will end up with a sequence of two numbers in the order they are thrown.  Let A be the event that the sum of the first two throws is 3.  Compute the probability of A.  A) 1/6  B) 1/12  C) 1/18  D) 1/36 | Question 16  Suppose you throw a die twice, noting the number obtained on each throw.  You will end up with a sequence of two numbers in the order they are thrown.  Let B be the event that the sum of the throws is at most 4.  Compute the probability of B  A) 1/6  B) 1/12  C) 1/18  D) 1/36 |
| Feedback: The correct answer is C) 1/18 | Feedback: The correct answer is A) 1/6 |
| Question 17  A college teaches a range of courses including maths, physics and IT.  Students choose a range of courses from these three subject areas. Currently 600 students are enrolled of whom 300 study maths courses, 120 study IT and 380 study physics courses. 40 students study courses from all three subject  areas.  200 maths students study physics as well. 60 physics students also study IT and 70 IT students also study maths. 20 students study physics and IT, but not maths.  How many students study none of these courses at all?   1. 60 2. 70 3. 90 4. 120 | Question 18  A college teaches a range of courses including maths, physics and IT.  Students choose a range of courses from these three subject areas. Currently 600 students are enrolled of whom 300 study maths courses, 120 study IT and 380 study physics courses. 40 students study courses from all three subject  areas.  200 maths students study physics as well. 60 physics students also study IT and 70 IT students also study maths. 20 students study physics and IT, but not maths.  How many students study maths but not physics or IT?   1. 70 2. 80 3. 90 4. 120 |
| Feedback: The correct answer is C) 90 | Feedback : The correct answe is A) 70 |
| Question 19  A college teaches a range of courses including maths, physics and IT.  Students choose a range of courses from these three subject areas. Currently 600 students are enrolled of whom 300 study maths courses, 120 study IT and 380 study physics courses. 40 students study courses from all three subject  areas.  200 maths students study physics as well. 60 physics students also study IT and 70 IT students also study maths. 20 students study physics and IT, but not maths.  How many students study both maths and physics but not IT? (160)   1. 120 2. 210 3. 380 4. 160 | Question 20  A college teaches a range of courses including maths, physics and IT.  Students choose a range of courses from these three subject areas. Currently 600 students are enrolled of whom 300 study maths courses, 120 study IT and 380 study physics courses. 40 students study courses from all three subject  areas.  200 maths students study physics as well. 60 physics students also study IT and 70 IT students also study maths. 20 students study physics and IT, but not maths.  How many students study courses from precisely two of these subjectareas?   1. 120 2. 210 3. 380 4. 160 |
| The correct answer is D) 160 | The correct answer is B) 210 |
| Question 21  An ordered sequence of four digits is formed by choosing digits without repetition from the set:  *{1, 2, 3, 4, 5, 6, 7}*  What is the total number of such sequences?  A) 780  B) 960  C) 240  D) 640 | Question 22  An ordered sequence of four digits is formed by choosing digits without repetition from the set :  *{1, 2, 3, 4, 5, 6, 7}*  What is the number of sequences which begin with an odd number?  A) 780  B) 960  C) 640  D) 480 |
| Feedback The correct answer is A 780. | Feedback The correct answer is D 480. |
| Question 23  An ordered sequence of four digits is formed by choosing digits without repetition from the set:  *{1, 2, 3, 4, 5, 6, 7}*  What is the number of sequences which end with an odd number?  A) 780  B) 960  C) 640  D) 480 | Question 24  An ordered sequence of four digits is formed by choosing digits without repetition from the set:  *{1, 2, 3, 4, 5, 6, 7}*  What is the number of sequences which begin and end with an odd number?  A) 720  B) 480  C) 240  D) 640 |
| Feedback : The correct answer is again D (480). | Feedback : The correct answer is C (240). |
| Question 25  An ordered sequence of four digits is formed by choosing digits without repetition from the set:  *{1, 2, 3, 4, 5, 6, 7}*  What is the number of sequences which begin with an odd number or end with an  odd number or both?  A) 720  B) 480  C) 240  D) 640 | Question 26  An ordered sequence of four digits is formed by choosing digits without repetition from the set:  *{1, 2, 3, 4, 5, 6, 7}*  What is the number of sequences which begin with an odd number or end with an  odd number but not both.  A) 720  B) 480  C) 240  D) 640 |
| Feedback : The correct answer is A (720). | Feedback : The correct answer is B (480). |