Variations on a Theme: Academic Integrity and Program Code

Abstracted from papers presented at ACE 2018 and ACE 2019

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What inspired us

- A 2016 ITiCSE working group
- Negotiating the maze of academic integrity in computing education
- Why is it a maze?
  - University guidelines and policies on academic integrity are seldom helpful
  - Many students and academics don't see how they apply to programming and other computing assessments
  - Academics have widely differing approaches and requirements about what assistance can be received and whether and how it should be acknowledged
  - No consistency even at a local level

Working group recommendations

1. For each assessment task, consider what constitutes acceptable academic integrity practice on various dimensions including attribution of code, code reuse, seeking aid, attribution of help, etc.

2. Link the defined acceptable practice to specific learning objectives and justify how these enhance the students' learning.

3. Explain to the students the academic integrity rules that apply to this situation, how they will be applied, and why they are justified in terms of learning objectives.

- The report suggested one way of doing this, and gave three examples
  - One for an introductory programming course
  - One for an advanced systems course
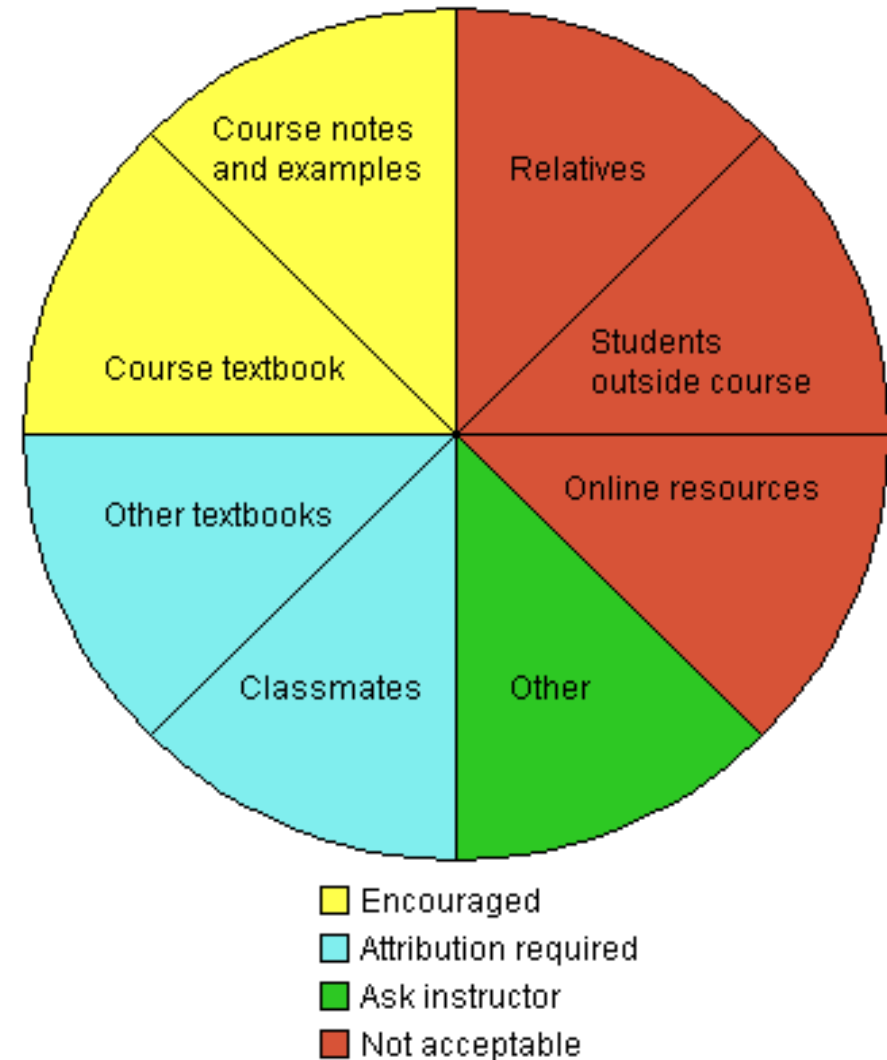 - One for a capstone project

Sample guideline: intro programming

This assignment, which is to be completed individually, is your chance to gain an understanding of fundamental concepts of program structure and coding syntax on which later learning will be based. It is important that you master these concepts yourself.

Since you are mastering fundamental skills, you are permitted to work from course examples, but you must acknowledge assistance from other textbooks or classmates. In particular, you must not use online material or help from others, as this would prevent you from mastering these concepts.

Assistance: Who can you get help from?

Use this diagram to determine from whom you may seek help with your programs.

Course notes and examples

Relatives

Course textbook

Students outside course

Other textbooks

Online resources

Classmates

Other

☐ Encouraged
☐ Attribution required
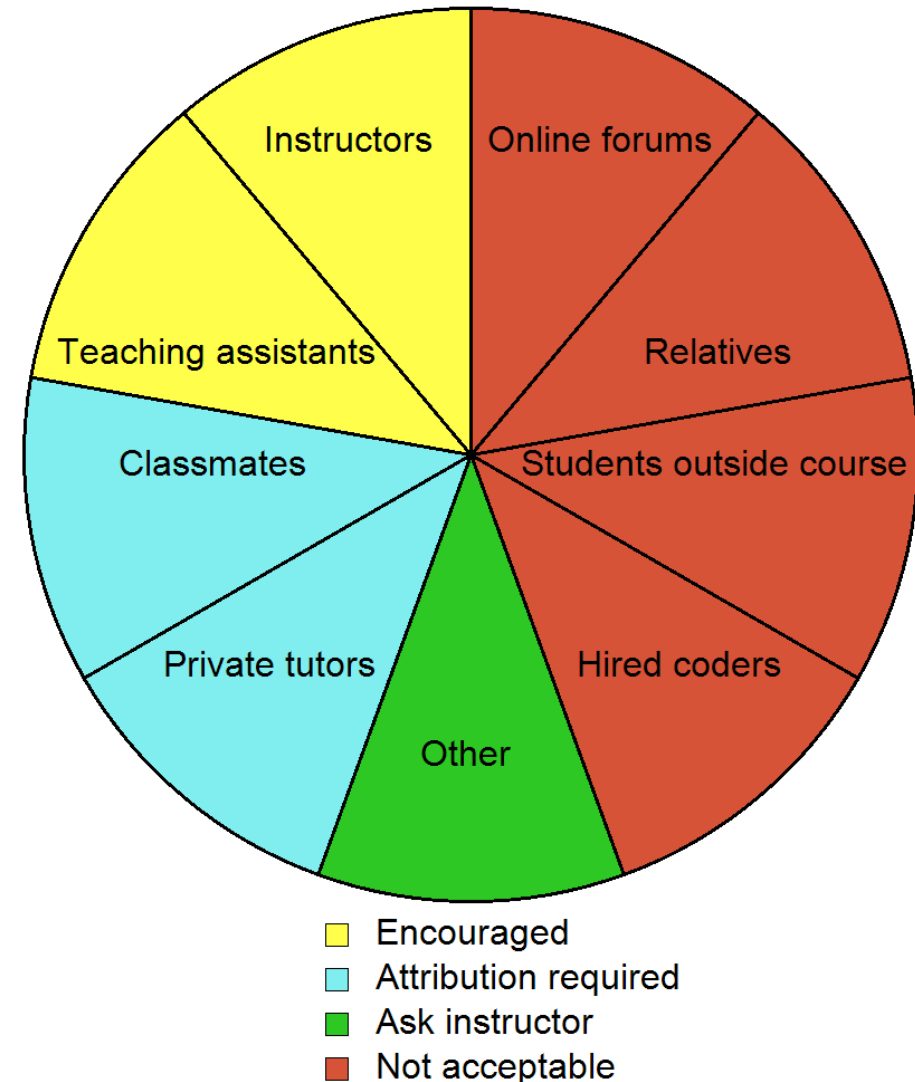☐ Ask instructor
☐ Not acceptable

Sample guideline: intro programming

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Resources: Where can you get code from?

Use this diagram to determine where you may find code to use in your programs.

Pie chart with segments:
- Online forums
- Relatives
- Students outside course
- Hired coders
- Other
- Private tutors
- Classmates
- Teaching assistants
- Instructors

Legend:
- ☐ Encouraged
- ☐ Attribution required
- ☐ Ask instructor
- ☐ Not acceptable

That was the theme; now the variations

- At three different universities we took up the challenge, but in three different ways
- We present these ways here, as examples of how the guidelines can be adopted
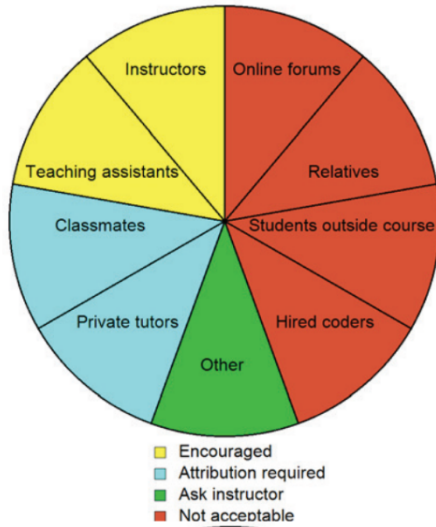
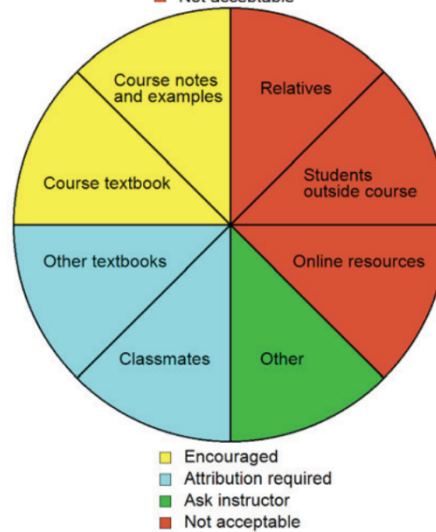# James Cook – use the wheels as they are

- Wholesale adoption across the degree program

- Use the wheels not per assignment, but per year of the degree

- Spend lecture time each year explaining them to students

- Display posters of the wheels in all computer labs

- Brand recognition! (wicked subliminal messaging)

FIRST YEAR

Assistance: Who can you get help from?

Pie chart sections: Instructors, Online forums, Relatives, Teaching assistants, Students outside course, Classmates, Hired coders, Private tutors, Other

Legend:
- Encouraged
- Attribution required
- Ask instructor
- Not acceptable

Resources: Where can you get code from?

Pie chart sections: Course notes and examples, Relatives, Course textbook, Students outside course, Other textbooks, Online resources, Classmates, Other

Legend:
- Encouraged
- Attribution required
- Ask instructor
- Not acceptable

SECOND YEAR

Source: Where can you obtain help?

Pie chart sections: Course staff, Online resources, Teammates, Textbooks, Classmates, Course notes and examples, Everyone else

Legend:
- Encouraged
- It depends - see Topic chart

Topic: What help are you getting?

Pie chart sections: Debugging code, Implementing code, Understanding OS concepts, Designing code, Understanding OS/161

Legend:
- Encouraged
- Attribution required
- Not acceptable

THIRD YEAR

Activity: What task are you completing?

Pie chart sections: Reviewing, Designing, Testing, Implementing, Debugging

Legend:
- Assistance encouraged
- It depends - see Source chart

Source: How are you getting assistance?

Pie chart sections: Licensed software, Co-worker, Contractor, Internal product, Online forum

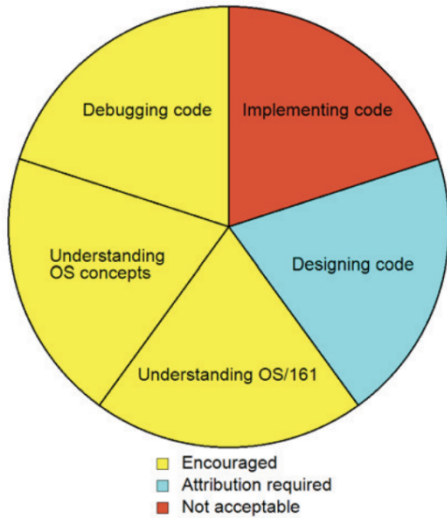Legend:
- Encouraged
- Consult manager
- Consult legal
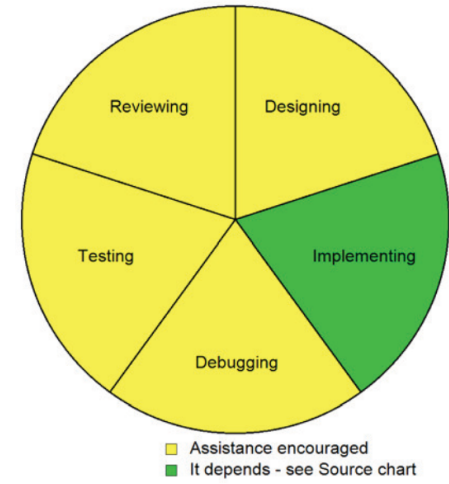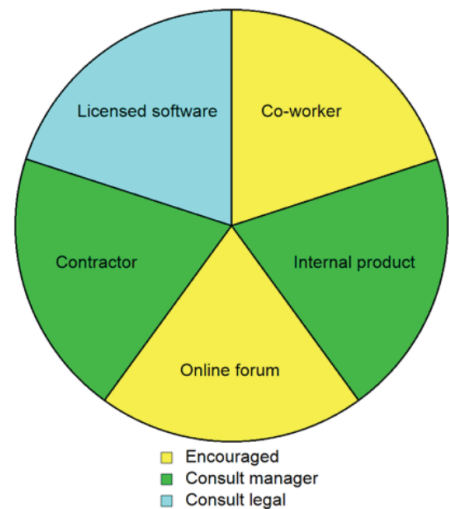
Simon *et al.*, "Negotiating the Maze of Academic Integrity in Computing Education," presented at the Proceedings of the 2016 ITiCSE Working Group Reports, 2016.

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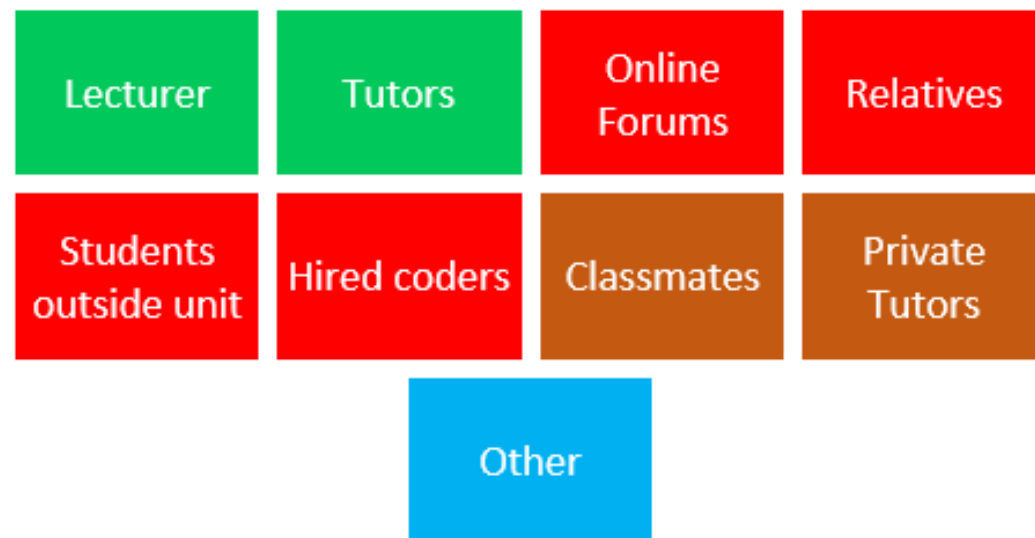
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Southern Cross – colour-coded grid

- Used on a per-assignment basis

- Some terminology needed changing

- Too hard to draw new wheels

- Instead used a grid with exactly the same sort of information

Getting Help

Who can you get help from? Use this diagram to determine from whom you may seek help with your program.

Lecturer	**Tutors**	**Online Forums**	**Relatives**
Students outside unit	**Hired coders**	**Classmates**	**Private Tutors**
	Other		

Encouraged	Attribution Required	Ask tutor	Not acceptable

This assignment, which is to be completed individually, is your chance to gain an understanding of the fundamental concepts of object-oriented programming and coding syntax on which later learning will be based. It is important that you master these concepts yourself.

Since you are mastering fundamental skills, you are permitted to work from the examples in the study guide or textbook, but you must acknowledge assistance from other textbooks or classmates. In particular, you must not use online material or help from others, as this would prevent you from mastering these concepts.

Newcastle – plain text table

- Used on a per-assignment basis
- Some terminology and guidelines needed changing
- Expressed the same ideas in a simple text table
- Added the working group's later guidelines on how to reference program code

Academic integrity – getting assistance or code

This assignment is your chance to gain an understanding of fundamental concepts of program structure and coding syntax on which later learning will be based. It is important that you master these concepts yourself.

Since you are mastering fundamental skills, you are permitted to work from the textbook and course examples, but you must acknowledge assistance from other textbooks or classmates. In particular, you should try not to use code or algorithms from external sources, and not to obtain help from people other than your instructors, as this can prevent you from mastering these concepts. However, if you do get code or assistance from these external sources, you must 'attribute' it: both in your journal, and in comments in your code, you must clearly explain where or who the code or assistance came from, and how much help or code was provided.

Here is a detailed guide to who you can get help from, and where you can get code from. Please pay careful attention to it.

Assistance: who might you want help from?	Status
Yourself, your partner	Highly encouraged
Your lecturer, your tutor	Encouraged
Classmates, other tutors	Attribution required
Online forums, relatives, friends, other students not in this course	Not acceptable
Any other sources	Ask the lecturer

Resources: where might you want to get code from?	Status
Course textbook, course notes and examples, your partner	Encouraged
Other textbooks	Attribution required
Online programs, hired coders, relatives, friends, other students	Not acceptable
Any other sources	Ask the lecturer

So how should students reference code?

Each reference should include:

- its purpose: why the external code or assistance was sought;

- the date the code or assistance was used;

- the source of the code or assistance;

- the author or person assisting, if known;

- the url, if applicable;

- any adaptation that was required to incorporate external code;

- a brief description of the assistance that was provided, if applicable.

Referencing code – an example

```
//############################################
// Reference P7: personal assistance
// Purpose: deal with NullPointerException errors
// Date: 25 Aug 2017
// Source: fellow student Susan Piper
// Assistance: explained the need to instantiate each
        object in the array
//############################################


teamMember[i] = new Player();


//############################################
// End reference P7
//############################################
```

Referencing code – another example

```
###########################################
# Reference A3: externally sourced algorithm
# Purpose: sort a list of sublists by the second element
        in each sublist, descending
# Date: 2 May 2017
# Source: Python documentation
# Author: Andrew Dalke and Raymond Hettinger
# url: https://docs.python.org/3/howto/sorting.html
# Adaptation required: changed variable names; saw need to
        assign result to original list name
###########################################
freqList = sorted(freqList, key = lambda wordFreq:
        wordFreq[1], reverse = True)
###########################################
# End reference A3
###########################################
```

Future work

- Focus groups and a survey
- Explore the students' understandings of academic integrity and program code
- At these three universities, and one that hasn't adopted the guidelines
- If James Cook proves superior, will it be because of the wheels?
- Or because of the degree-wide adoption?

Take-home message

- Academic integrity in computing really is different from academic integrity in essays

- Academic integrity requirements in computing vary considerably between different courses and different levels

- Students are often confused as to what is acceptable, which isn't surprising, because so are their instructors

- For every single assessment item we need to set academic integrity requirements in terms of the learning objectives

- And we need to communicate those requirements clearly and simply to students – in whatever way best suits us

- Of course some students will still breach the requirements – but we can be more confident that this isn't through ignorance