The term paper for the course is to be on a topic in graph theory that we will not cover in class. A list of suggested topics is below. You are also welcome to choose a topic of your own to do your paper on, provided that you discuss it with me first. To avoid clashes over materials, only one person will be allowed to work on a given topic.

**Dates and requirements**
- You need to choose a topic, and inform me of your topic, by Friday, 19th September. The paper itself is due in class on Friday, 31st October.
- The paper should be typed on a computer but you must submit a hard copy. Pages must be numbered.
- Your paper should be about 3000 to 4000 words (about 10 to 12 pages if you use an 11 point font and 1\frac{1}{2} spacing).

**Honor code**
You may not obtain assistance from anyone else on the paper. However, I am willing to discuss your project and give you hints, pointers to references, and so on.

**Content**
Your paper should choose an area of graph theory and give me some or all of the following:
- Basic definitions in the area. (You do not need to define things we have covered in class, just new concepts.)
- Some idea of the history of the area. Who first looked at it and when? Why were they interested in it? What were the first problems posed and results proved?
- The most important results in the area. Who proved them, and why are they significant?
- Proofs of some fundamental or important results. If these are too long, you can instead give a short outline of how the results are proved.
- Examples illustrating the concepts and results.
- If you have room, discussion of important subareas of the area.

**Citations**
All sources you use in preparing the paper should be given in a list of references at the end of the paper, and appropriate citations should be given in the paper itself. (However, don’t overdo it: you don’t have to give a citation for every individual fact you got from a given book or article.) You should give me the original citation for any important results. Do not just cite a textbook; find out who first proved it and give me the citation for the original paper. (But you should still cite textbooks for things like definitions and any other things you take directly from them, such as a proof.)

**Information resources**
The Science and Engineering Library has several resources which may be useful to you.
1. There are several books which either contain survey papers on various areas of graph theory, or are good sources of information on some applications of graph theory. In particular, take a look at:
   - *Selected Topics in Graph Theory* (volumes 1, 2, 3), edited by L. W. Beineke and R. J. Wilson, Academic Press, London, various years.
In addition, our class textbook, and also the following graph theory textbooks, have useful information on some special topics.


2. Just browse the graph theory shelves: QA 166 is graph theory, and other areas of combinatorics are in QA 164 and QA 165; some graph theory books may be in those call numbers.

3. MathSciNet is a great online resource for finding references on a given topic. It is available under the ‘Databases’ tab of the ‘Search Library’ link on the library’s web site. Note that graph theory has classification code 05C and if you specify 05C in the classification field you will make sure that you only find papers that have some graph theory content.

4. Google Scholar may be another useful way to find papers and also to track down other papers that cite the ones you have already found. If you go into Google Scholar from the ‘Databases’ tab of the ‘Search Library’ link on the library’s web site and log in with your VUNet ID, you can access journal papers directly inside Google Scholar.

5. **You are also encouraged to ask the reference librarians in the Science and Engineering Library for help in finding information.** In particular, they can help you use MathSciNet. They may also suggest sources of information that had not occurred to you.

**Using online resources**

You are encouraged to use online resources to get started. However, things like Wikipedia, class notes you find online, etc. are not considered authoritative references. Almost all of your final references should be formally published material (books, journal articles - electronic journals are fine, conference proceedings, etc.).

**Suggested topics**

- Ramsey theory
- Graph minors
- Matroids
- Extremal graph theory
- Graph reconstruction
- Eigenvalues of graphs (spectral graph theory)
- Graphs and groups (highly symmetric graphs)
- Random graphs and the probabilistic method
- Random walks and electrical networks
- Perfect graphs
- Enumeration (counting) of graphs (could be exact counting or asymptotic formulae)
- Nowhere-zero flows and cycle covers
- Graph drawing algorithms
- The Travelling Salesman Problem (TSP)
- Small world networks
- Szemerédi’s Regularity Lemma