FINDING THE INFORMATION YOU NEED
Using the library’s electronic resources to find peer-reviewed journal articles

Introduction
Before you start a project or a piece of research you need to find out what has already been written on your subject area. This enables you to acquire an understanding of the subject you are researching, and the key issues involved. Looking through the vast amount of literature available and identifying useful information can be a time consuming task so it is important to know how to plan and carry out your search effectively.

This guide takes you through the steps involved in planning and carrying out a literature search:
- How to construct a search strategy to help you find information on a particular topic
- How to apply your search strategy to find relevant peer-reviewed journal articles from databases and other resources available via the library’s web pages
- How to manage your results

Using good quality information sources provides an academic context for your work. Citing such sources gives your work credibility and demonstrates that you can identify the important sources of information in your field and use them to provide a platform on which to base your ideas and discussions.

If a source cites the existing literature and provides a context, then it illustrates that the author has good knowledge of the subject area. There will also be some form of peer review. Peer review is essentially a quality control mechanism, where research is scrutinised by a series of independent experts to ensure that the research is based on sound principles.

A sound knowledge of information sources demonstrates that you have key information literacy skills. Information literacy is the ability to independently find good quality information and make discriminating use of it. This is a useful skill in an academic environment, but it is also a key transferable skill that will enable you to become a confident user of information throughout your working life.
Strategies for finding information

1. Define your research topic
Searching should be approached in a structured manner; once you have a clear idea of your research topic, write it down and highlight the most important concepts.

If the subject is a broad one you may need to focus on a specific aspect, otherwise it is likely that your search will retrieve many thousands of results.

2. Identify the key concepts
The concepts you have highlighted from your research topic will be the keywords or phrases that you are going to search for. Phrasing your research topic as a question can help to suggest the appropriate keywords:

<table>
<thead>
<tr>
<th>Research topic</th>
<th>Key concepts (Keywords)</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the roles of DNA and RNA in Protein synthesis...?</td>
<td>DNA, RNA, Protein synthesis</td>
</tr>
<tr>
<td>What function do forkhead transcription factors (FOX) perform in embryonic development...?</td>
<td>Forkhead Transcription Factor, Embryonic Development</td>
</tr>
</tbody>
</table>

Databases can only retrieve exactly the words you type into them so, in order to ensure that your search is comprehensive, you should consider:

- **Alternative words/phrases** that may be used to describe your subject e.g. Forkhead Transcription Factor / FOX, Embryonic Development / Embryo Development / Embryogenesis
- **Alternative spellings**, particularly American ones e.g. cell signalling / cell signaling.
- **Truncation (symbols)**. Keywords may have variant endings - singular, plural, adjectives or adverbs - all of which may be relevant to your subject. In order not to miss any references most databases allow you to type in the beginning of a word and then replace the possible variant endings with a symbol (usually, but not always, a *) e.g. gene* will find genes, genetic, genetics, genetically etc.

- **Wildcards** are used to represent one or no characters within a word - very useful for variant spellings: Signal*ing will retrieve records that include both signalling and signaling (Check under Section 9 below for the symbols used by each database)
3. How to link your keywords together
To carry out a successful database search you will have to combine your keywords using standard connecting terms. These are known as ‘operators’:

**AND** combines different concepts or terms and retrieves only those results where **ALL** of the concepts or terms are present.

If your research topic included, for example, the role of Forkhead transcription factors in embryonic development, you would search for:

Forkhead Transcription Factors **AND** Embryonic Development

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**Tip**

If your research topic/question includes terms such as ‘role of’, ‘effect on’, ‘influence of’, ‘comparison between’ etc - **AND** can be substituted for these terms when searching a database.

**OR** is used to retrieve related or synonymous terms:

If you are researching into ‘**cell signalling**’, you may also want to include results that include ‘**signal transduction**’

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The red area represents the results found.

Results that contain either term **OR** both terms are returned.
**NOT** retrieves records containing one term but **NOT** another e.g. Intracellular **NOT** extracellular

Proximity operators
These can be used to increase relevancy by returning only those results where the terms appear close to each other (and so are hopefully related).
For example, in the Web of Knowledge database, **NEAR/x** retrieves records that contain one term within 'x' words of another term: *Muscle NEAR/5 contraction* retrieves records only where both terms appear within 5 words of each other (in any order).

(Check under Section 9 below for the symbols used by each database)

Phrase searching
If you only want to return results where two or more terms appear as a phrase, use quotation marks “...”: e.g. “Skeletal muscle”
If the quotation marks are omitted most databases will return results where the terms are present anywhere in the record and so are less likely to be relevant.

4. LIMITS

Limits you might set include:

**Publication date** - how far back do you want to search? If you're researching into an area that changes rapidly and you are not interested in its historical development you might limit your search, for example, to the last five years only.
Languages - do you need to limit the search to languages you speak (databases are international in coverage)?

Age - Do you want to limit your search to a particular age group: e.g. Skeletal muscle lipid accumulation in children

5. Search each database separately
Although it is possible to search across a range of databases simultaneously, using the library’s Discover search engine, you must search each database separately in order to carry out a comprehensive search and to take full advantage of the special features that each database offers.

Use the keywords you have identified at stage 2 to search each source. Remember to link your keywords using AND/OR/NOT (etc) if you want to carry out a more effective search.

Try searching for each keyword/phrase separately and then link the results afterwards (this is easily done using a database’s ‘search history’ function). This gives you much greater flexibility in the way you:
- Link terms
- Substitute terms if you’re not getting the results you expected
- Introduce and link new terms
- Remove terms that aren’t providing the results you expected

If you enter a search query in one long string you do not have the same flexibility to add, remove or change the way the terms are linked.

6.1 View results and select relevant papers
Your search results will include an abstract or summary of the paper and, where the University of Liverpool Library has an electronic subscription to the journal in which the paper appeared, you can link directly to the full text by clicking the **is it @Liverpool?** button.

6.2 Saving your results and search strategy
Having reviewed and selected relevant papers from your results, you will need to save them so that you can refer to them when you write up your project. Databases allow you to e-mail, print, save to file or download to reference software packages.

6.3 Referencing software packages
One way to manage your references, is to use a referencing software package such as Endnote. The major databases (including those listed below) allow you to export citations directly into Endnote, where they can be stored, organised and accessed from off-campus as well as on-campus.
When you are writing up your research, you can add references at the appropriate point in your document in the chosen citation style and create a bibliography 'as you write'.

7. Citing your sources
Referencing, also called citing, simply means that whenever you quote from another author's work, or use their ideas in your own work, you should acknowledge that you have done so.

A reference is required when you:

- **paraphrase** (use someone else’s ideas in your own words)
- **summarise** (use a brief account of someone else’s ideas)
- **quote** (use someone else’s exact words)
- **copy** (use someone else’s figures, tables or structure)

References enhance your writing and assist your reader by:

- showing the breadth of your research
- strengthening your academic argument
- showing the reader the source of your information
- allowing the reader to consult your sources independently
- allowing the reader to verify your data

Please check with your department to find out their specific requirements with regard to style of referencing to be used in your project.

8. Plagiarism
Plagiarism is passing off someone else’s ideas as your own. If you don’t know when to cite and reference the sources you have used, you may be guilty of plagiarism without realising it. If you keep a record of where you find your information, then it will be easy to find the details when you need to reference your work.
9. BIBLIOGRAPHIC DATABASES

This section covers:

- How to navigate through to databases from the library web pages
- How to search for information on the major medical/scientific databases:
  - Medline
  - Scopus
  - Web of Knowledge

9.1 Navigation

To link through to a database from the library home page
http://www.liv.ac.uk/library/

Select the **Electronic Library** option from within the **Quick Links**
The three databases covered in this guide are available in the Key Resources section. Click on the icons to link through to the databases.
9.2 Searching for peer reviewed articles on Medline (Ovid), Scopus and Web of Knowledge

9.2.1 MEDLINE (Ovid)

MEDLINE, the U.S. National Library of Medicine’s premier bibliographic database, contains bibliographic citations and author abstracts from more than 4,800 biomedical journals published in the United States and 70 other countries.

KEY FEATURES

- **Coverage from 1948**

- **MeSH (Medical Subject Heading) terms**
  A distinctive feature of Medline is the provision of over 20,000 subject (MeSH) terms that are used to describe very precisely the content of an article. Every record entered on Medline is examined and has one or more MeSH terms added to describe its content.

  Use MeSH terms:
  - To search with greater accuracy and retrieve more relevant results: a MeSH term is added to a Medline record only when the article contains relevant information about the topic; keyword searches, on the other hand, will also return records where your topic is just mentioned in passing.
  - To retrieve records containing synonymous terms, which might be missed in a keyword search. For example, the MeSH heading *Apoptosis* will also return results where 'programmed cell death' or 'cell suicide' have been used.
  - To identify broader, narrower or related terms, should you need to refine your search.

Note Sometimes you may not find an appropriate MeSH term to match your topic. If this happens, use a keyword search instead – it’s OK to search Medline using a combination of MeSH terms and keywords.
• ‘Explode’ and ‘Focus’
Use with MeSH terms

Tick the ‘Explode’ box to include the results that match the MeSH term plus those that match more specific related terms.
E.g. In the above example, the search will return results for Muscle, Smooth and the narrower terms, Esophageal Sphincter, Lower and Muscle, Smooth, Vascular and Myometrium.

The ‘Explode’ function can be used to increase the number of results should the initial search produce fewer than expected.

Tick the Focus box if you want to return only the results where the topic is a major focus of a paper.
Of course, you do risk excluding results where the topic is more peripheral, but the paper is still relevant to your research.
This feature can be used to reduce the number of results should the initial search produce too many.

The following ‘operators’ can be used to combine MeSH terms and/or keywords and phrases on Medline (Ovid)

<table>
<thead>
<tr>
<th>AND</th>
<th>Results include both terms</th>
<th>OR</th>
<th>Results include either term</th>
<th>NOT</th>
<th>Results exclude one term</th>
<th>PHRASE</th>
<th>Exact match of terms</th>
<th>TRUNCATION &amp; WILDCARDS</th>
<th>Searches for variant word endings &amp; spellings</th>
<th>PROXIMITY OPERATORS</th>
<th>Number of words between search terms—increases relevancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>cells and signalling</td>
<td>PNS or peripheral nervous system</td>
<td>DNA not RNA</td>
<td>“posterior abdominal wall”</td>
<td>Cell* signaling</td>
<td>neuronal adj3 survival</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Searching the database**

The default view of Medline (Ovid) is set to show the Advanced Ovid Search screen.

For greater control of your search strategy enter each search term separately. In this example we are looking for papers on the effect of **Cell growth** on **Muscle development**.

We will take advantage of the Medical Subject Headings (MeSH) as well.

Input your first keyword:

1. ![Image of Ovid interface](image1.png)

   One or more MeSH terms will be displayed. Select the appropriate term(s) and click on the 'Continue' button.

   (Note that at this stage also, you can search for your term as a keyword instead of, or as well as using the MeSH terms (useful if your search did not map to a desirable MeSH heading)).

2. ![Image of Ovid interface](image2.png)
If a single MeSH heading is chosen, a list of subheadings is displayed. Check the 'Include all subheadings' box for a comprehensive search. Click on the *Continue* button to execute the search.

Tip

If your search strategy produces too many results, subheadings can be used to restrict the focus of your search. Select one or more by clicking in the checkbox that precedes each desired subheading.

Your results are displayed on the Search History page:

Repeat the above steps for your second (and any subsequent) keywords:
If two or more MeSH headings are selected (as in stage 6 above (Cell Proliferation or Cell Division)), the Subheadings stage (3 above) will be bypassed and the combined results set will display directly on the Search History screen:

Once each keyword has been entered you can then combine them:
Building up a search strategy this way makes it much easier to replace search terms and introduce new ones if your initial search doesn't produce the results you expected.

Display your results, select and save.

Click on the Export button to display the Export Citation List and select the Endnote option to export your results directly into Endnote:
9.2.2. Scopus

Scopus is the largest abstract and citation database of research literature and quality web sources and has a good coverage of scientific, technical, and medical literature (over 20,000 journal titles indexed).

**KEY FEATURES**

- Coverage from 1823
- 80% of records have abstracts
- Records added since 1996 include references with full text links. Having identified a relevant paper, you can check through the references cited in that paper to identify and link through to previous research.
- 'Cited by' function. This helps you to identify and follow up more recently published research. Having identified a relevant paper, you can link through to the work of other authors who have subsequently cited this paper.

To get the best out of Scopus, use the following 'operators' to combine keywords/phrases:

<table>
<thead>
<tr>
<th><strong>AND</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Results include both terms</td>
</tr>
<tr>
<td><strong>OR</strong></td>
</tr>
<tr>
<td>Results include either term or both terms</td>
</tr>
<tr>
<td><strong>AND NOT</strong></td>
</tr>
<tr>
<td>Results exclude one term</td>
</tr>
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| cells and signalling | PNS or peripheral nervous system | DNA and not RNA | “posterior abdominal wall” | cell* signal*ing | Neuronal w/4 survival |
Searching the database

Enter your search terms and combine using the search boxes provided.

Your results are displayed. Click on the Sort by Relevance bar to re-rank your results and bring the most relevant results to the top.
As with Medline, you can also enter one search term at a time and use the ‘Search History’ function to combine your terms. This gives you greater flexibility and makes it much easier to replace search terms and introduce new ones if your initial search doesn’t produce the results you expected. This function isn’t quite as ‘user-friendly’ on Scopus, but try it out and see.

In the example above we are combing search 1 (pns OR peripheral nervous system) AND search 2 (myelination). To do this, enter #1 and #2 in the Combine queries search box.
9.2.3. Web of Knowledge

The Web of Knowledge databases hold some 17 million records, covering a broad range of scientific, medical & technical publications. Because of this wide coverage of the literature, it's a good database to use for interdisciplinary searches.

KEY FEATURES

- Coverage from 1899

- Web of Knowledge provides access to the citation indexes (collectively called Web of Science), ISI Proceedings and Journal Citation Reports

- Includes references. Having identified a relevant paper, you can check through the references cited in that paper to identify and link through to previous research.

- 'Cited' function. This helps you to identify and follow up more recently published research. Having identified a relevant paper, you can link through to the work of other authors who have subsequently cited this paper.

Tip: To get the best out of Web of Knowledge, use the following 'operators' to combine keywords/phrases:

<table>
<thead>
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<th>AND</th>
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<th>NOT</th>
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<td>&quot;posterior abdominal wall&quot;</td>
<td>cell* signal$ing</td>
<td>neuronal near/4 survival</td>
</tr>
</tbody>
</table>
Searching the database

For this example we are using the default All Databases search. Enter your search terms and combine. Make sure the 'Topic' option is selected in the right-hand menu.

Your results are displayed:
Select the references you want to export to EndNote by ticking the checkboxes to the left of the appropriate citations.

As you page forward and select more results, these are automatically added to your ‘Marked List’.

When you are ready to export results, select the Marked List option (at the top of the screen).

If you click on an article title to view the abstract, you can also link to the references to help you trace the research back through earlier papers. You can also see who else has subsequently cited the paper, thus following through to more recent research on the topic.
10. Searching the Web for quality information
When you search the web for information you have to examine the sources very carefully to ensure that the information is
• accurate
• authoritative
• current
You must consider:
• **What type of web site is it?** Commercial? Academic? Governmental? Academic sources will have web addresses that end with words like .ac.uk or .edu and governmental sources will have the word .gov in their web address.
• **Who created the information?** Are they qualified? If you cannot see who has written/created a web page, be wary of using it in your work.
• **When was the information placed on the web?** If you cannot see when information was last updated you cannot cite it correctly in your work so, again, be wary of using it.

You've probably all used Google but there are other internet search engines you should think about using if you want to find quality information and peer-reviewed journal articles on the Web:

**Google Scholar**
http://scholar.google.com/

Google Scholar enables you to search specifically for scholarly literature, including peer-reviewed papers, theses, books, preprints, abstracts and technical reports from all broad areas of research. Google Scholar can find articles from a wide variety of academic publishers, professional societies, preprint repositories and universities, as well as scholarly articles available across the web. Just as with Google Web Search, Google Scholar orders your search results by how relevant they are to your query, so the most useful references should appear at the top of the page.

**Scirus**
http://www.scirus.com

A science-specific Web search engine covering reports, peer-reviewed articles, patents, pre-prints, journals, and technical and medical data.

**Note** When you search for information on the Scopus database, Scirus is automatically searched as well.
Web gateways
Use Web Gateways to find high-quality information on the Web. They act as 'electronic libraries', bringing together links to quality-controlled resources. You can usually browse for information by subject category or search the gateway’s collections. Gateways often also carry other useful information services, such as announcements of new conferences and current awareness bulletins.
To find quality web sites try:
Health on the Net (reliable online health information)
http://www.hon.ch/
Or
BUBL (Selected Internet resources covering all academic subject areas)
http://bubl.ac.uk/

11. FURTHER HELP
If you require any help or advice on using the library's electronic resources to find information for your project, please contact Ken Linkman in the Harold Cohen Library.
Email k.linkman@liv.ac.uk
Phone 0151 794 4366
Or just call into the library and ask for me.

Ken Linkman
Subject Librarian
Harold Cohen Library

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