Class Objectives
Upon completion of this class, participants will be able to:

- Recognize the fields in a PubMed citation
- Search the fields with direct entry commands
- Apply right-hand truncation when appropriate
- Use Searching Tool features, including Limit and Search Fields
- Improve development of search strategies
- Use My NCBI to set advanced search filters

1. Support
- **Ask-a-Librarian** - Available from Health Sciences Library web page. Health Sciences Library reference librarians will respond to Ask-A-Librarian questions within one day, Monday-Friday.
- **Health Sciences Library Newsletter – The Appendix** - Our Health Sciences Library Update e-mail subscription service keeps you informed! Subscribe at http://hsclibrary.uchsc.edu/newsletter/subscribe.php
- **PubMed Help** - Available above the Search Query box on every PubMed screen.
- **PubMed Alerts** - Subscribe to a list and receive an email notification from NIH on PubMed updates or whenever PubMed is down or experiencing difficulties: [https://list.nih.gov/archives/pubmed-alerts.html](https://list.nih.gov/archives/pubmed-alerts.html)

2. Basic Summary Citation
One PubMed - MEDLINE citation represents one journal article and is composed of fields that provide specific information about the journal article. Here are the basic fields shown in a Summary display:

- **Title** of the journal article
- **Authors**
- **Journal Source Information**
- **Language** in which the article was published
- **PubMed ID (PMID)** the unique number identifier assigned to the article
- **Citation status** – indicates indexing progress
- **Related Articles link**

NOTE: To search for a particular citation status, enter one of the search terms below followed by the [sb] search tag. Example: in process[sb] These status tag are explained in the table on page 2.
3. Full MEDLINE Tagged Display
The complete PubMed-MEDLINE citation is displayed in a two-character tagged field format. Use this format to export citations into reference management programs. You may search by field for a more specific approach. See “Search by Field” on page 3.

4. Additional Search Features
Phrase Searching
PubMed searches for phrases under these conditions:
- The phrase is entered with a search tag: \textit{kidney allograft [tw]}
- The phrase is enclosed in double quotes: “\textit{kidney allograft}”
- The term is hyphenated: \textit{first-line}
- The term is truncated: \textit{kidney allograft}*  
The above formats for phrase searching instruct PubMed to bypass automatic term mapping. Instead PubMed looks for the phrase in its Index of searchable terms. If the phrase is in the Index, PubMed will retrieve citations that contain the phrase.

\textbf{NOTE:} When you enclose a phrase in double quotes, PubMed will \textbf{not} perform automatic term mapping which includes explosions of MeSH terms. For example, “health planning” \textbf{will} include citations that have the MeSH heading, Health Planning, but \textbf{will not} include the more specific indentations (e.g., Health Care Rationing, Health Care Reform) that are included with automatic MeSH mapping and explosion.

\textbf{Truncation}
Place an asterisk (*) at the end of a string of characters to search for all terms that begin with that string. The asterisk may only be used at the \textbf{end} of a string of characters.

\textbf{Example}: mim* \textit{will find all terms that begin with the letters m-i-m-i-c-;} e.g., mimic, mimics, mimicking. PubMed searches the first 600 variations of a truncated term.

\textbf{NOTE:} Truncation turns off automatic term mapping. For example, heart attack* will not map to the MeSH term, Myocardial Infarction, or include any of its more specific terms, e.g., Myocardial Stunning.
Stopword List
Stopwords (a, an, and) are routinely dropped from a search query because they result in too many results. For the complete list, see http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=helppubmed&part=pubmedhelp&rendertype=table&id=pubmedhelp.T43.

Nesting Boolean Logical Operators
When using multiple Boolean operators in PubMed, they are processed left to right. Example: salmonella AND hamburger OR eggs
Retrieves records that include both terms salmonella AND hamburger as well as all records with the term eggs, whether or not they contain the other two terms.

To change the order in which terms are processed, enclose the terms(s) in parentheses. This is called nesting. Example: salmonella AND (hamburger OR eggs)
This will retrieve records that contain the term salmonella, as well as one or both of the terms hamburger OR eggs.

5. Searching by Field
Search fields can be specified using PubMed’s search field tags. Not all searchable fields are included in this handout. A complete list of the field names and tags is found at http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=helppubmed&part=pubmedhelp&rendertype=table&id=pubmedhelp.T44.

Search Field Tags

<table>
<thead>
<tr>
<th>Affiliation [AD]</th>
<th>Issue [IP]</th>
<th>Place of Publication [PL]</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Fields [ALL]</td>
<td>Journal Title [TA]</td>
<td>Publication Date [DP]</td>
</tr>
<tr>
<td>Author [AU]</td>
<td>Language [LA]</td>
<td>Publication Type [PT]</td>
</tr>
<tr>
<td>Comment Corrections</td>
<td>Last Author [LASTAU]</td>
<td>Publisher Identifier [AID]</td>
</tr>
<tr>
<td>Corporate Author [CN]</td>
<td>MeSH Date [MHDA]</td>
<td>Secondary Source ID [SI]</td>
</tr>
<tr>
<td>Entrez Date [EDAT]</td>
<td>MeSH Subheadings [SH]</td>
<td>Substance Name [NM]</td>
</tr>
<tr>
<td>First Author Name [1AU]</td>
<td>NLM Unique ID [JID]</td>
<td>Title [TI]</td>
</tr>
<tr>
<td>Full Author Name [FAU]</td>
<td>Other Term [OT]</td>
<td>Title/Abstract [TIAB]</td>
</tr>
<tr>
<td>Grant Number [GR]</td>
<td>Owner</td>
<td>Transliterated Title [TT]</td>
</tr>
<tr>
<td>Investigator [IR]</td>
<td>Pagination [PG]</td>
<td>UID [PMID]</td>
</tr>
<tr>
<td></td>
<td>Personal Name as Subject [PS]</td>
<td>Volume [VI]</td>
</tr>
<tr>
<td></td>
<td>Pharmacologic Action MeSH Terms [PA]</td>
<td></td>
</tr>
</tbody>
</table>

Rules
- Each search term should be followed with the appropriate search field tag, which indicates which field will be searched. The search field tag must follow the term (e.g. aromatherapy [mh] )
- Search field tags must be enclosed in square brackets.
- Case and spacing do not matter: ice [mh] = Ice[mh] = ICE [MH]
- Terms entered with a search tag (e.g., [mh]; [majr]; [tw]) will not generate the “Did you mean” message (PubMed’s spell check feature).

MeSH headings [mh]
MeSH headings can be searched using two search field tags:
[mh]  to search a MeSH heading
[majr] to search a MeSH heading that is a major topic of an article
PubMed automatically searches the MeSH heading as well as the more specific terms beneath that heading in the MeSH hierarchy; i.e., the term is exploded.

To turn off automatic explosion of MeSH headings, use one of the following tags:


NOTE: Searching with MeSH headings will exclude in process and publisher-supplied citations, as they are not indexed with MeSH.

MeSH Subheadings [sh]
You can directly attach subheadings to MeSH headings using the format MeSH heading/subheading.  See page 7 for a complete list of MeSH Subheadings.

- Two letter abbreviations for subheadings or the full subheading name may be used.
  Examples:  thromboembolism/pc  thromboembolism/prevention and control
  toes/in [majr]  toes/injuries [majr]

- Only one subheading may be attached to a MeSH heading at a time.  To attach multiple subheadings, combine each MeSH/subheading combination with the OR connector or use the MeSH Browser.

  Example:  thromboembolism/pc [majr] OR thromboembolism/di [majr]

- For a MeSH/subheading combination, PubMed always explodes the MeSH term and also searches the subheading and its grouping if there is one.  See page 8 for a complete listing of the subheading groups or Subheading Pre-explosions.

In the example below, the subheading therapy or members of the therapy grouping (e.g., diet therapy) will be attached to the MeSH term (hypertension) or one of its indentions (e.g., hypertension, malignant).

Example:  hypertension/th

NOTE: To turn off both the MeSH heading explosion and subheading groupings, you would enter: 
hypertension/th [mh:noexp]  hypertension/th [majr:noexp]

These search for only the subheading therapy attached to only the MeSH term hypertension (with "majr," only as the main point).

- To turn off the subheading grouping, use the tag [sh:noexp].  You may only do this when "free-floating" a subheading.

Text Words [tw]
Terms or numbers that are searched with the Text Words [tw] field tag will be searched in the following fields:

- Title
- Abstract
- MeSH headings, Subheadings, Publication Types (includes single words and phrases)
- Other Terms field
- Chemical Names of Substances
- Secondary Source Identifier (The SI field identifies other data sources, databanks and accession numbers of molecular sequences discussed in MEDLINE articles.)
- Personal Name as Subject

Title Word Searching [ti]
Enter significant terms (numbers, too) from the title of an article. Each word must be followed by the [TI] search field tag. Words should be combined with the AND operator.

Example: The title is “Memory improvement following cardiac transplantation”.

Author Searching [au]
Two situations where the [au] tag is required:

- To turn off automatic truncation of an author’s name, surround the author’s name with double quotes and use the [au] search tag.
- Use the [au] tag when entering only a last name.  Example: woods [au]

Personal Name as Subject [ps]
Use the [ps] tag to search for citations to articles about a named individual.  The name is searched in the conventional author searching format:  lastname + initial(s)
Example: lincoln a [ps]

**Journal Title [ta]**
Search for journals using the full journal title, or the MEDLINE abbreviation, or the ISSN.


**NOTE**: All single-word journal titles should be tagged with [ta]. **Example**: cell [ta]

**Publication Type [pt]**
Describes the type of material the citation represents: Twin Study, News, Review, Clinical Trial, Retracted Publication, Letter. Use the [pt] tag for searching.

**Example**: vascular diseases [majr] AND twin study [pt]

**Unique Identifier Searching [pmid]**
To search using the PubMed Unique Identifier (PMID), type in the number with or without the search field tag [pmid].

*Example*: 11073054

- You can search for several Unique Identifier numbers by entering each number in the query box separated by a space, PubMed will OR them together. Do not enter the OR connector.

*Example*: 7715939 11073054

- To search a Unique Identifier in combination with other terms you must use the search field tag, [pmid].

  **Example**: smith [au] AND (10403340 [pmid] OR vaccines [mh])

**PubMed Central ID [pmcid]**
To search using the PubMed Central identifier, type in the number preceded by PMC or followed by [pmcid]

*Example*: PMC2653652

- Search for multiple PMCIDs by typing OR between entries

  **Example**: PMC2653652 OR PMC1142103

**Affiliation [ad]**
May include the institutional affiliation and address, including email address, of the first author of the article - as it appears in the journal. Use the [ad] search tag. This field can be used to search for work done at specific institutions.


6. Using the Advanced Search Features
Click on the Advanced Search link, above the Search Query box, to see features like History, Limits, Field Searching and Indexes, and other special features. We recommend that you search from this page.

**Search History**
PubMed will hold all your search strategies and results in the Search History. The Search History displays the search number, your search query, the time of search, and the number of citations in your results.

**Field Searching**
Selecting specific fields to search will provide a more refined search result. Use the Search by Author, Journal, Publication Date, and more section of Advanced Search to limit terms to a specific search field.

**Limits**
Use Limits to further narrow your search to a specific author, journal, year, age range, gender, language, etc.

**More Resources**

**Clinical Queries**
This specialized search query is intended for clinicians and has built-in search "filters" based on research done by R. Brian Haynes, M.D., Ph.D. at McMaster University in Canada. Four category filters are provided: Therapy, Diagnosis,
Etiology, and Prognosis. Two emphasis filters are provided: Sensitivity (a broad range of experimental designs) and Specificity (limited to randomized, blinded, clinical trial studies)

Systematic Reviews
This feature is provided to help clinicians locate systematic reviews and similar articles. It combines your search term(s) with citations identified as:
- Systematic reviews
- Meta-analyses
- Evidence-based medicine
- Reviews of clinical trials
- Consensus development conferences
- Guidelines

Citations from journals specializing in clinical review studies are also included. The resulting retrieval can be further refined using PubMed's Limits

Medical Genetics
Filters provided to help clinician locate clinically relevant research on medical genetics. Developed in conjunction with the staff of GeneReviews: Genetic Disease Online Reviews at GeneTests, University of Washington, Seattle.
- Diagnosis
- Differential Diagnosis
- Clinical Description
- Therapy
- Genetic Counseling
- Molecular Genetics
- Genetic Testing

Topic Specific Queries
Includes links to a wealth of special search queries on a variety of health topics.

MeSH Database
PubMed’s MeSH (Medical Subject Headings) Database displays MeSH terms in a hierarchical structure and lets users select terms for searching. In addition you can directly attach subheadings and limit terms to a MeSH Major Term. When you enter a term that is not a valid MeSH term, the MeSH Database will check against the MeSH Mappings and display the associated MeSH term.

Journals
Journals Translation Table contains: Full journal title, MEDLINE abbreviation, International Standard Serial Number (ISSN)

Example: The journal of cell biology

NOTE: If a name of a journal also happens to be a MeSH term or a one-word title, it must be searched with a field tag [Journal]. Otherwise, PubMed will search the term as a MeSH heading and as a Text Word, and the search will not include the term as a journal name.
Example: A search for Science untagged will not search for citations from the journal Science.

Single Citation Matcher
Use the Single Citation Matcher to look for a single citation. This feature is a fill-in-the–blank form that lets you enter journal citation information to locate a single citation, or items from a particular volume or issue of a journal.

7. Advanced Results Features
Send to RSS Feed
RSS feeds bring content (like news items) from multiple online sources into one reader or Web page. The feeds are updated as new items are added from each source. RSS readers are available to download free from the Web. Firefox or iGoogle can also incorporate RSS Feeds from PubMed. While viewing results from a PubMed search, click the “RSS” link and follow the instructions.

My NCBI Features
NIH offers a terrific My NCBI help resources at http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=helpmyncbi&part=MyNCBI. Lots of useful tools are available through My NCBI: A few you should consider:
- Saved Searches and Auto-alerts
- Collections
- My Bibliography
- Filters, especially Custom Filters

Please evaluate this class at http://hslibrary.ucdenver.edu/classes/evaluate.php
Subheadings

- Subheadings further describe a particular aspect of a MeSH heading.

The entire list of subheadings follows:

| Abnormalities                  | AB | Isolation & Purification | IP |
| Administration & Dosage        | AD | Legislation & Jurisprudence | LJ |
| Adverse Effects                | AE | Manpower                  | MA |
| Agonists                       | AG | Metabolism                | ME |
| Analogs & Derivatives          | AA | Methods                   | MY |
| Analysis                       | AN | Microbiology              | MI |
| Anatomy & Histology            | AH | Mortality                 | MO |
| Antagonists & Inhibitors       | AI | Nursing                   | NU |
| Biosynthesis                   | BI | Organization & Administration | OG |
| Blood                          | BL | Parasitology              | PS |
| Blood Supply                   | BS | Pathogenicity             | PY |
| Cerebrospinal Fluid            | CF | Pathology                 | PA |
| Chemical Synthesis             | CS | Pharmacokinetics          | PK |
| Chemically Induced             | CI | Pharmacology              | PD |
| Chemistry                      | CH | Physiology                | PH |
| Classification                 | CL | Physiopathology           | PP |
| Complications                  | CO | Poisoning                 | PO |
| Congenital                     | CN | Prevention & Control      | PC |
| Contraindications              | CT | Psychology                | PX |
| Cytology                       | CY | Radiation Effects         | RE |
| Deficiency                     | DF | Radiography               | RA |
| Diagnosis                      | DI | Radionuclide Imaging      | RI |
| Diagnostic Use                 | DU | Radiotherapy              | RT |
| Diet Therapy                   | DH | Rehabilitation            | RH |
| Drug Effects                   | DE | Secondary                 | SC |
| Drug Therapy                   | DT | Secretion                 | SE |
| Economics                      | EC | Standards                 | ST |
| Education                      | ED | Statistics & Numerical Data | SN |
| Embryology                     | EM | Supply & Distribution     | SD |
| Enzymology                     | EN | Surgery                   | SU |
| Epidemiology                   | EP | Therapeutic Use           | TU |
| Ethics                         | ES | Therapy                   | TH |
| Ethnology                      | EH | Toxicity                  | TO |
| Etiology                       | ET | Transmission              | TM |
| Genetics                       | GE | Transplantation           | TR |
| Growth & Development           | GD | Trends                    | TD |
| History                        | HI | Ultrasonography           | US |
| Immunology                     | IM | Ultrastructure            | UL |
| Injuries                       | IN | Urine                     | UR |
| Innervation                    | IR | Utilization               | UT |
| Instrumentation                | IS | Veterinary                | VE |
| Virology                       | VI |                          |    |

Subheading Groupings

- Related subheadings have been grouped to allow for additional, relevant retrieval.
- Searching with the ‘pre-exploded’ subheading retrieves citations indexed to all the subheadings in the grouping.
- Not all subheadings have been placed in these groupings – some do not logically fit.

Please evaluate this class at http://hslibrary.ucdenver.edu/classes/evaluate.php
You may also choose to “free-float” a subheading with a MeSH heading using the Boolean AND with the subheading field tag of [sh]. This is typically done when you want to search for a subheading that cannot be applied to the MeSH heading you are also searching.

Example: hypertension [mh] AND toxicity [sh]