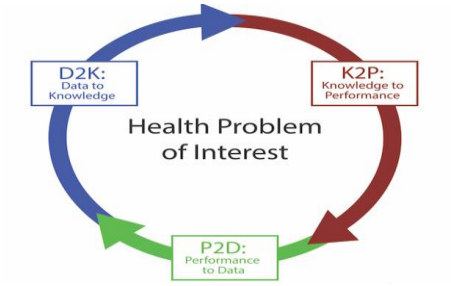


**Mobilizing Computable Biomedical Knowledge (MCBK) Training**
**Online Pilot Class**
**December 15, 2021 to January 6, 2022**
**Funded by IMLS Grant RE-250159-OLS-21**
**Dr. Deborah Swain, Project Director**

## Instructors and Speakers Information

Program Director: Dr. Deborah Swain (dswain@nccu.edu)
Co-Program Director: Dr. Christopher Cunningham (chris.cunningham@nccu.edu)

Speakers:
U of Michigan: Charles Friedman (12/15), Nancy Allee (12/16), Kathleen Young (12/20), Joshua Richardson, T&P Workgroup, RTI (12/22), Rachel Richesson (1/3)
U of Arizona: Jerry Perry (12/23)
UNC-CH: Javed Mostafa (12/27)
U of South Carolina: Feili Tu-Keefer (12/28),
U of California at San Francisco: Chris Shaffer (12/30)

MCBK: Jodyn Platt (Michigan), T&P Workgroup and Gabe Rios (Indiana), S&I Workgroup

## Mentors Information

1. Jodi Philbrick (UNT)
2. Suliman Hawamdeh (UNT)
3. Robin Ann Yurk, MD, MPH
4. Shannon Jones (Charleston, SC)
5. Ana Cleveland (UNT)
6. Kim Mayo (NCCU, retired)

## Course Description

The purpose of the course is to train educators and professionals in Library and Information Science (LIS) to find tools and utilize searches for Computable Biomedical Knowledge (CBK). Professionals, clients, authors, and users of healthcare may be unfamiliar with the technology and electronic publication format being applied to Mobilizing Computable Biomedical Knowledge (MCBK). MCBK publications include, in addition to text and graphics, "dynamic knowledge" with encodable prediction models and computable code. Such computable knowledge can provide readers, for example, a diagnosis or a tool to compute a risk score for infection from data. Learning how to support publications and collections with computable knowledge is the primary learning objective for this pilot class. Students will review sample materials, explore tools, interact with knowledgeable speakers, and provide feedback and suggestions for developing Open Educational Resource (OER) materials to be available after the course.

## Resource Materials

Research: All classes will be recorded to provide data for analysis and Open Educational Resource (OER) development in 2022 to sustain the MCBK training.

Articles, documents, posters, video links, *and* slides posted on the class website. See https://www.nccu.edu/mcbk-home and "Class Materials: Articles, Posters, Slides" page.

1. MCBK Manifesto
2. ICKM2020 Friedman slides
3. *LHS* Article (invited early reading): **https://doi.org/10.1002/lrh2.10244**
4. Author instructions – *Learning Health Systems* (LHS) journal
5. Background articles on MCBK and Trust (for December 22)
    a. Do You Trust the Medical Profession? A growing distrust could be dangerous to public health and safety. NY Times. Jan. 2018. See: https://www.nytimes.com/2018/01/23/upshot/do-you-trust-the-medical-profession.html
    b. Building and maintaining trust in clinical decision support: Recommendations from the Patient-Centered CDS Learning Network. Dec. 2019. See: https://onlinelibrary.wiley.com/share/JMBHDCYUQ6IU7Q9P92CF?target=10.1002/lrh2.10208
    c. Poster: Examining the Theories of "Knowledge Commons" and Applications in Learning Health Systems. MCBK Conference 2019. See: https://medicine.umich.edu/sites/default/files/content/downloads/Poster%20Combined_0.pdf (scroll to poster #14)
    d. **(optional)** Hess, Charlotte and Ostrom, Elinor, "A Framework for Analyzing the Knowledge Commons : a chapter from Understanding Knowledge as a Commons: from Theory to Practice." (2005). Libraries' and Librarians'

Publications. 21. See: https://surface.syr.edu/cgi/viewcontent.cgi?article=1020&context=sul

6. "Coded Bias" video (MIT): via YouTube at: https://www.youtube.com/watch?v=xu6rwo_Y1vQ.
7. 5 background articles on Bias and Algorithmic Justice (highest to lowest priority):
    a. Hemphill C. Responsible AI: leveraging data and technology to counteract bias. STAT. Aug. 2021. See: https://www.statnews.com/2021/08/06/leverage-responsible-ai-counteract-bias-health-care/.
    b. Christensen D et al. Medical algorithms are failing communities of color. Health Affairs Blog. Sept. 9, 2021. See: https://www.healthaffairs.org/do/10.1377/hblog20210903.976632/full/.
    c. Panch T et al. Artificial intelligence and algorithmic bias: implications for health systems. Journal of Global Health. 9(2) Dec. 2019. See: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6875681/pdf/jogh-09-020318.pdf.
    d. McCradden MD et al. Ethnical limitations of algorithmic fairness solutions in health care machine learning. The Lancet: Digital Health. May 2021. See: https://www.thelancet.com/journals/landig/article/PIIS2589-7500(20)30065-0/fulltext.
    e. Obermeyer Z, et al. Dissecting racial bias in an algorithm used to manage the health of populations. Science. 366(6464):447-53 Oct. 25, 2019. See: https://www.science.org/doi/10.1126/science.aax2342.
8. [Article on Publication Access Through Tiered Interaction & Exploration (PATTIE).]
    a. [Background on New Tools for entrepreneurs]
9. AHRQ Poster: https://drive.google.com/file/d/1ASTW2Rx-_zUctDq8qJm5_rK_9H7HTAft/view. (or poster authored by Dr. Krautscheid and Ed Lomatan, #10 from this list: https://mobilizecbk.med.umich.edu/news-events/annual-meetings/2021-meeting.)
10. Systematic Reviewing, PRISMA, PICO, and scoping reviews:
    a. https://www.youtube.com/watch?v=IHVO4FC2_Is
    b. https://guides.mclibrary.duke.edu/sysreview/types
    c. http://www.prisma-statement.org/
    d. http://www.prisma-statement.org/PRISMAStatement/Checklist
    e. http://www.prisma-statement.org/PRISMAStatement/FlowDiagram
    f. http://www.prisma-statement.org/Extensions/ScopingReviews
11. Also from Dec. 28: Chung, et al., Journal of Hand Surgery, 2006: col. 31a
12. Posters and articles from Gabe Rios (for teams or partners from Dec. 30):
    a. Posters from MCBK meeting:

Poster #6: Leveraging CBK to Support Learning Health Systems and Their Efforts to Realize the Quintuple Aim, Jerome A. Osheroff

[see models and the "patient journey illustrating desired future state"]
https://docs.google.com/presentation/d/1Q1F-8ZyzAvGAJ001HFgrH20V64mQTYBr96Ozmo3dzNE/edit#slide=id.ge4a18bb09e_0_289

Poster #10: AHRQ CEPI Evidence Discovery and Retrieval (CEDAR), Peter W. Krautscheid [CEDAR is a system that provides unified search of multiple AHRQ Center for Evidence and Practice Improvement (CEPI) repositories]
https://drive.google.com/file/d/1ASTW2Rx-_zUctDq8qJm5_rK_9H7HTAft/view

Poster #12: A public repository to mobilize computable biomedical knowledge artifacts, Güneş Koru [a repository where users can create and maintain CBKs via web-browser interface; API supports automation]
https://docs.google.com/presentation/d/1_2gR72PWX_fMgaRIs9DXN7NQcDBo673v1cjtYsxeybM/edit#slide=id.ge289e3db1a_0_43

Poster #15: Towards Providing Clinical Context for a Diabetes Risk-Prediction Use Case via User-centered Explainability, Shruthi Chari {real-world example of how CBK is used]
https://docs.google.com/presentation/d/168AbbvGpQtp1PiWhwzVX5cpQcbWLuD4gBN7MQLrZZ0A/edit#slide=id.ge3f6e9ca0a_30_0

Poster #21: A FHIR Framework to Ignite Biomedical Knowledge Management, Muhammad Afzal [ FHIR-based KMS may increase mobilization of CBK with many smaller units for finding the precise data for predicting benefits and harms regarding a health care decision]
https://www.dropbox.com/s/mvu4w9dk0q5tgrw/MCBK-Poster.pdf?dl=0

b.Papers from *LHS* journal:

**The University of Alabama at Birmingham COVID-19 Collaborative Outcomes Research Enterprise: Developing an institutional learning health system in response to the global pandemic**, Jami L. Anderson,Rebecca A. Reamey,Emily B. Levitan,Irfan M. Asif,Monica S. Aswani,Faith E. Fletcher,Allyson G. Hall,Kierstin C. Kennedy,Dustin Long,David Redden,Alia Tunagur … https://onlinelibrary.wiley.com/doi/full/10.1002/lrh2.10292

**Developing real-world evidence from real-world data: Transforming raw data into analytical datasets**
Lisa Bastarache,Jeffrey S. Brown,James J. Cimino,David A. Dorr,Peter J. Embi,Philip R.O. Payne,Adam B. Wilcox,Mark G. Weiner
https://onlinelibrary.wiley.com/doi/full/10.1002/lrh2.10293

13. [Resources from Chris Shaffer] See White Paper in email.]
14. [Resources from Rachel Richesson]
15. Observational Health Data Sciences & Informatics (OHDSI) slides from Juan Bando (12-4-20)
16. [NLM information]

## Course Learning Objectives and Outcomes

Learning how to find tools, utilize searches, and support publications and collections with computable knowledge is the primary learning objective for this class.

| Goals and Objectives | Student Learning Outcomes (Students will be able to…) | Measurement |
|---|---|---|
| **Find tools and utilize searches for CBK:** LIS professionals can help design more effective data archives and repositories to improve healthcare information accessibility for professionals, patients, and researchers. | 1. Design MCBK archive repository for healthcare papers or articles with code, data, algorithms. | 1. Present guidelines for an MCBK archive repository |
| **Review the technology and electronic publication format for CBK:** Competency with electronic journals to provide "dynamic knowledge" that readers can validate immediately. For example, for data, programming code or encodable prediction models in healthcare, readers can provide feedback and contribute to faster | 2. Identify accessibility requirements for readers to evaluate code, data, algorithms. | 2. Document directions for authors and users to access data to evaluate healthcare device or procedures in electronic articles |

| | | |
|---|---|---|
| development of diagnosis treatments or tools to compute risk of coronavirus infection | | |
| **Provide feedback and suggestions for developing OER:** Based on the pilot class and a community of practice (CoP) from universities, libraries, and medical schools, sustainable open educational resources (OER) will be developed with online materials for future use. (2022) | 3. Plan for OER resources based on pilot classes and MCBK: Cheryl Casey's toolkit and guidelines (Arizona), Will Cross (NC State), and Josh Bullock (Kansas)<br>4. Create CoP dist list from collaborative partners and pilot class | 3. Students provide feedback for dynamic, interactive learning resources OER (Open Educational Resources); pilot class reviews OER toolkit and recommends legal approach<br>4. Test dist list with email; update webpage |

## Course Structure

Students are expected to attend 2 orientations and 9 classes in Zoom meetings. The two 2-hour orientations are 10:30am-12:30pm, and the nine 4-hour online classes are 12-4pm EST for a total of 40 hours of training. Classes have a speaker and/or discussion topic. There will be breakout sessions with 2 mentors for each student cohort during most classes. On Dec. 28 and Jan. 5 a full class discussion in a "knowledge café" format will be held instead of breakout sessions. A total of 15 students will be enrolled and receive up to $1500 as stipend in 2022.

The learning methodology depends on interactive participation in Q&A with speakers, breakout sessions with mentors, and full class discussions (knowledge café). In an online course, participation is generally defined as active contributions to discussions, and completing assignments, assessments, polls, and feedback.

Schedule:
December 15 – Opening Orientation (2 hrs)
Dec 16 – class 1 (4 hrs)
Dec 20 – class 2 (4 hrs)
Dec 22 – class 3 (4 hrs)
Dec 23 – class 4 (4 hrs)
Dec 27 – class 5 (4 hrs)
Dec 28 – class 6 (4 hrs)
Dec 30 – class 7 (4 hrs)
Jan 3 – class 8 (4 hrs)
Jan 5 – class 9 (4 hrs)

Jan 6 – Closing Orientation (2 hrs)

## Communication Policies

Students will be expected to communicate any issues or concerns to Dr. Deborah Swain (*dswain@nccu.edu*) or Dr. Cunningham (*chris.cunningham@nccu.edu*). If attendance is a problem for a class, students should communicate at least 24 hours in advance. Cohorts are encouraged to communicate with each other and their mentors.

Regularly check and exchange emails with fellow students and mentors. Note web page updates at https://www.nccu.edu/mcbk-home .

Virtual Office Hours: Online students will have access to email and cell phone of Program Director: *dswain@nccu.edu*; 919-906-2684.

## Technical Support

*Posting contact information and a link to Information Technology Services (ITS) support and NCCU and at Zoom.*

## Learning Modules & Content Organization

*Note that a "Conference Program" may be provided later.*

**Learning Objectives & Activities Alignment to be individually listed for each class**

| Class | Student Learning Outcome Subject | Activities |
|---|---|---|
| 1- Thurs., Dec. 16 | Open Access to Data, Research, and Scholarship | Follow-up to orientation: slides and video<br>Review Sample article<br>Survey from UVa |
| 2- Mon., Dec. 20 | Publishing | Discuss Author Instructions and sample article<br>Process for journal submission |
| 3- Wed., Dec. 22 | Knowledge Bases and Repositories | Review background articles and poster before<br>Discuss CBK archive repository draft desiderata |

| Class | Student Learning Outcome Subject | Activities |
|---|---|---|
| 4- Thurs., Dec. 23 | Bias in Machine Learning, Algorithms, AI | View "Coded Bias" video before<br>Read sample articles (including "Algorithmic Justice" guidelines) |
| 5- Mon., Dec. 27 | Entrepreneurship and Application Development | Read PATTIE article<br>Discuss new tools for apps |
| 6- Tues., Dec 28 | Systematic Project Review<br>Scoping Review<br>Librarian roles | AHRQ Poster<br>Video on PICO<br>Selected reading (PRISMA, plus) |
| 7- Thurs., Dec 30 | CBK Technical Infrastructure | Review and summarize poster with partner or team<br>Discuss principles for technical infrastructure to support CBK |
| 8- Mon., Jan 3 | MCBK Metadata and research (data) networks | Discuss metadata; website review exercise<br>Example OHDSI slides |
| 9- Wed., Jan 5 | NLM Update | Attend review of NLM updates<br>Discuss Covid-19 impact on CBK |

## Assignments

All in-class discussions and both group and individual reports will be submitted and shared on the website. All work will be used for analytics in 2022 to define Open Educational Resources (OER). No grades.

**Assignments**

Throughout this pilot class, students will complete small reading assignments and provide feedback in breakout session or to full class. There will be evaluation forms and discussion, but no grades are assigned. Attendance and participation are expected, however.

**Experience Presentations and Sharing**

Following break-out sessions and individual reading reviews, there will be class discussions and presentations. Results of breakout sessions will be documented by a student to cover prompts based on speaker or material and shared with full class after the breakout. All classes are recorded. Feedback will be shared with speakers and data will be collected to help design OER.

## Schedule and Activities

This schedule allows quick access to dates and times, and to the most important information about the pilot course.

| Session | Learning Activities | Resources |
|---|---|---|
| Orientation, **Dec. 15** (10:30 – 12:30 pm EST) | **Introduce MCBK**<br>Describe LHS (Learning Health Systems) background and "MCBK Manifesto"<br><br>Meet mentors and partners<br><br>Review pilot process, schedule, expectations, and webpage: https://www.nccu.edu/mcbk-home | Speaker: Charles Friedman<br><br>Assignment: Friedman slides on CBK. Zoom video (12/15/21) |
| 1-Class, Thurs., **Dec. 16** (12-4 pm EST) | Complete pre-class assessment survey<br><br>**Open Access to Data to Knowledge (to application and practice)**<br><br>Describe library context for MCBK (open research and scholarship); complete survey from UVa<br><br>Volunteer for Lib Guide dev | Review cycle of learning from slides and video.<br><br>*LHS* Article (invited early reading): **https://doi.org/10.1002/lrh2.10244**<br><br>Speaker: Nancy Allee on "open science" and "open data"<br><br>Interactive discussion with mentor (breakout sessions)<br><br>Class discusses together (Lib Guide ideas) |
| 2-Class, Mon., **Dec. 20** (12-4 pm EST) | Evaluate article on immunization calculation engine<br><br>Describe online *LHS* journal's mission, challenges and growth and Author Instructions<br><br>Process for manuscript submission, review, production, publication/open access/and indexing. | Review CYCLE OF LEARNING to application and practice topic: Data to Knowledge (D2K), Knowledge to Performance (K2P) and Performance to Data (P2D) and Open Access<br><br>*LHS* Article (how CKP manuscript differs): **https://doi.org/10.1002/lrh2.10285**<br><br>Speaker: Kathleen Young<br>(background on Learning Health Systems follow-up with Charles Friedman)<br><br>Interactive discussion with mentor (breakout sessions) |
| 3-Class, | **Trust for knowledge bases** | Review assigned readings |

| | | |
|---|---|---|
| Wed., **Dec. 22** (12-4 pm EST) | **and repositories**<br><br>MCBK Trust and Policy (T&P) Workgroup | Speaker: Josh Richardson, T&P MCBK Workgroup<br><br>Review preliminary survey results by T&P MCBK Workgroup<br><br>Interactive discussion with mentor (breakout sessions)<br><br>Discuss CBK archive repository draft desiderata<br><br>Assignment for Dec. 23: "Coded Bias" documentary video (MIT) |
| 4-Class, Thurs., **Dec. 23,** (12-4 pm EST) | **Bias in Machine Learning (algorithms in AI and ML)** using Ethics of Care framework<br><br>Review "Thought Piece" and Call to Action<br><br>Review inclusion guidelines and bias analysis, plus "Algorithmic Justice"<br><br>Engaging different disciplines | Discuss "Coded Bias" documentary video (MIT)<br><br>Five (5) selected articles from annotated bibliography or lit review<br><br>Speaker: Jerry Perry (S&I MCBK Workgroup) will review Sustainability and Inclusion issues and "mobilizing" aspect of MCBK<br><br>Interactive discussion with mentor (breakout sessions)<br><br>Full class discussion and follow-up with Jerry. |
| 5-Class, Mon., **Dec. 27,** (12-4 pm EST) | **Entrepreneurship and application development**<br><br>New Tools for entrepreneurs.<br><br>Prototype system called Publication Access Through Tiered Interaction & Exploration (PATTIE). | Read article on PATTIE<br><br>Speaker: Javed Mostafa (UNC-CH)<br><br>Advancing research in new areas (CBK and DSS)<br><br>Interactive discussion with mentor (breakout sessions) |
| 6-Class, Tues., **Dec 28**, (12-4 pm EST) | **Systematic Project reviews**<br><br>Librarians as reviewers and authors<br><br>Evidence-based research<br><br>Academy of Medicine stds, PICO, and PRISMA reviews | Video on PICO: https://www.youtube.com/watch?v=IHVO4FC2_Is<br>Selected reading: https://guides.mclibrary.duke.edu/sysreview/types<br><br>Speaker: Feili Tu-Keefer (U South Carolina)<br><br>Interactive discussion with FULL CLASS (knowledge café) |

| | | |
|---|---|---|
| 7-Class,Thurs., **Dec 30,** (12-4 pm EST) | Review posters from MCBK Conf. 2021 (Gabe Rios)<br><br>**Guiding Principles for Technical Infrastructure to Support Computable Biomedical Knowledge (White Paper)** | Select with team/partner poster or paper (Jan. 5).<br>Note: AHRQ Poster<br><br>Speaker: Chris Shaffer (UC-San Francisco)<br><br>Interactive discussion with mentor (breakout sessions)<br><br>Report out |
| 8-Class, Mon. **Jan 3,** (12-4 pm EST) | **Overview MCBK metadata and the nature of different research (data) networks** and how MCBK knowledge might connect with the available data.<br><br>Example: Observational Health Data Sciences & Informatics (OHDSI). | Overview of metadata.<br>Activity on website identification.<br><br>Speaker: Rachel Richesson<br><br>Interactive discussion with mentor (breakout sessions)<br><br>Background slides from Juan Banda (Georgia State) on OHDSI data collaboration |
| 9-Class, Wed.,**Jan 5,** (12-4 pm EST) | **Update on NLM Tools and Resources**<br><br>Creating learning resources and videos<br><br>Complete post-class assessment survey | Discuss posters and papers from MCBK conference.<br><br>Speaker: Kate Majewski, NLM<br><br>NLM Resources: Research & Development and NLM Tools for Moving to Future with FAIR Principles<br><br>Interactive discussion with FULL CLASS (knowledge café) |
| Closing Orientation, **Jan. 6** (10:30 – 12:30 pm EST) | Share plans and LIS designs for OER (Open Educational Research)<br><br>Human-Computer Interactions and Interface UX | Deborah Swain (Grant project director) and Chris Cunningham (Grant co-project director)<br><br>Creative designs for MCBK following pandemic impact and Impact of Covid-19 Pandemic on Data Science |

## Student Assessment and Activities Alignment

Assess: This pilot training includes pre-class and post-class assessment surveys.

After reviewing course materials (articles, posters and video) and interacting with knowledgeable experts, students will provide feedback, course assessments, and suggestions for developing Open Educational Resource (OER) materials in 2022.

During the pilot class, students will demonstrate the ability to:

1. Examine computable biomedical knowledge articles and posters.

2. Identify approaches to validating data, analytics, predictive models and biomedical devices.
3. Engage in activities of discovery and critical thinking about potential for bias in computable biomedical tools.

4. Explain and apply a wide range of teaching strategies and learning activities to developing repositories and standards for CBK materials.

5. Design pilot activities to develop OER materials in 2022.

6. Utilize array of resources and technology from the *Learning Health Systems* (LHS) journal.

7. Collaborate with LIS professionals to plan effective and responsive instruction in the future based on pilot class experience.

8. Complete pre-class and post-class assessment surveys.

## Netiquette & Discussion Board Participation

One of the most effective strategies for learning are discussions that engage and pull experiences from professionals and students attending. Feel free to be clear and explicit during class meetings and breakout sessions.

**Behavior:**

Participation is critical for maximizing your learning experiences in this pilot course and your contribution to MCBK educational development. You are required to be part of an online community who interact, through discussion, to enhance and support the professional development of the group. Thank you.

Some characteristics of excellent discussion contributions are outlined below:

- **NETIQUETTE:** Be courteous and respectful to your classmates and your instructor through considerate etiquette. In this course, that includes (but is not limited to):
    - Maintaining a formal, respectful, civil, professional tone with all course communications, including but not limited to journals, discussion boards, wikis, and emails.
    - Using clear language. and avoiding text-speak.
    - Avoiding derogatory language, obscenities, and hate speech.

## Attendance Policy

Students will inform program director and co-director of any attendance issues 24 hours in advance if possible: Dr. Deborah Swain (*dswain@nccu.edu*) or Dr. Cunningham (*chris.cunningham@nccu.edu*). *Full attendance and participation are expected.* If a student drops from the pilot course or misses more than two sessions, the impact on stipend will be evaluated. All students are required to complete pre- and post-surveys to submit Dec. 15 (pre-) and Jan. 5 (post-).

## After Training Pilot

Course information and recordings will be available at the training web page: (https://www.nccu.edu/mcbk-training-resources )

In addition, new materials based on course to be provided as Open Educational Resources (OER) with sustainability goals.

Class "reunion" in June, 2022.