

# Arizona Biosecurity Workshop

Dec. 7-8, 2017 | Arizona State University | Tempe, Arizona  
 Memorial Union | Room 221, Arizona Ballroom

Note: Speakers, presentations and presentation times are subject to change.

<b>Who should attend?</b>	Administrators, biosafety professionals, Do-It-Yourself (DIY) practitioners, emergency responders, law enforcement personnel, members of the public, Native American Tribal Members, policymakers, regulators, researchers, students and other interested parties.
<b>What is the purpose?</b>	The workshop focuses on engaging with biosecurity concerns in an applied and practical manner. We believe that there currently is a gap in the knowledge between the experts discussing technical, policy implications and the professionals in the trenches trying to manage biosecurity risks. This workshop allows participants to collaborate on biosecurity issues.
<b>What is biosecurity?</b>	Biological security (biosecurity) is the risk- and threat-based control measures established to prevent the unauthorized access, misuse, loss, theft, diversion and intentional release of valuable biological materials, pathogens, toxins, information, expertise, equipment, technology and intellectual property that have the potential to cause harm to humans, animals, plants, the environment, public safety or national security.
<b>Who is presenting?</b>	<ul style="list-style-type: none"> <li>➢ Special Agents from the FBI Headquarters in Washington, D.C., and the FBI Phoenix Weapons of Mass Destruction unit assist in leading the workshop and also present on biosecurity topics.</li> <li>➢ Representatives from the Centers for Disease Control (CDC) Biological Select Agent and Toxin (BSAT) program discuss biosecurity from a CDC-BSAT perspective.</li> <li>➢ Representatives from the NIH Office of Science Policy Division of Biosafety, Biosecurity and Emerging Biotechnology discuss government policies on Dual Use Research of Concerns and Gain of Function.</li> <li>➢ Subject-matter experts discuss biosecurity topics to assist in developing best practices.</li> <li>➢ Honored guests discuss the importance of biosecurity and implications for Arizona and the region.</li> </ul>
<b>How do I register?</b>	Register online   <a href="http://cfo.asu.edu/asu-biosecurity-workshop">cfo.asu.edu/asu-biosecurity-workshop</a>
<b>Are CE points available?</b>	Yes. Attendees may receive up to 2.0 continuing education/maintenance points for attending the entire workshop.
<b>How much is it?</b>	<b>There is no cost to participants.</b> However, to ensure there are enough light refreshments and snacks, all participants <b>must register for the event by Dec. 1, 2017.</b>
<b>What is the capacity?</b>	<b>250 attendees</b>

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## Arizona Biosecurity Workshop: Pre-Event

Wednesday, Dec. 6 | noon–1 p.m. | Arizona State University | Tempe, Arizona

Tempe campus | COOR 5536

**EnLIGHTeNING Lunch - School for the Future of Innovation in Society**

with Megan Palmer and Sam Weiss Evans

Limited to the first 35 attendees

Learn more | [sfis.asu.edu/node/2376](https://sfis.asu.edu/node/2376)

## Arizona Biosecurity Workshop: Day 1

Thursday, Dec. 7 | Arizona State University | Tempe, Arizona

Memorial Union | Room 221, Arizona Ballroom

Note: Speakers, presentations and presentation times are subject to change.

**Morning theme: An introduction to biosecurity and why it matters**

**8 a.m. Program begins**

**8:05 Introductions** | Leon Igras, David Gillum and Shelley Jones

**8:20 Acknowledgements** | Nichol Luoma

**8:30 ASU welcome address: Day 1 kickoff** | David Guston

**8:40 FBI welcome address** | Michael DeLeon

**8:50 FBI WMD program overview** | Philip Bates

The FBI WMD Directorate was created to deny both state and non-state actors the access to the materials and technology necessary to carry out a WMD attack. As the lead agency for the investigation of terrorism, we use our robust resources to address the vulnerabilities posed by biological pathogens and toxins. We address this issue through several programs to include preparation and planning; response and investigation; and intelligence gathering.

**9:20 Defining biosecurity: Background** | Barbara Owen and David Gillum

American Biological Safety Association (ABSA) International supports our members and our private and public-sector partners by participating in global biosecurity regulatory reform and integrating biosecurity risk management strategy/elements across ABSA program areas. To this end, a Biosecurity Task Force was appointed to define the term “biosecurity” and, based on that definition, a survey was administered that evaluated membership biosecurity program support needs. Survey data confirmed members would benefit from biosecurity becoming an area of focus and reinforced the need to establish a Biosecurity Credential. ABSA council has now appointed a second Biosecurity Task Force to create a proposed framework for establishing a Biosecurity Credential. This presentation will address how ABSA defines Biosecurity and discuss ABSA’s path forward for integrating biosecurity elements into ABSA’s strategic plan including the establishment of a Biosecurity Credential. Following this update, there will be a group discussion regarding biosecurity issues pertinent to workshop attendees.

- 9:30**      **Group discussion: Questions about biosecurity** | Barbara Owen and David Gillum
- How are biosecurity risks assessed and how do they differ from biosafety risks?
  - What constitutes a biosecurity concern and at what point does that concern warrant action?
  - What tools are available to assist in assessing biosecurity risks?
- 9:45**      **Biosecurity: Responsibility of the research and security communities** | William So
- The importance of basic and applied research of all fields of science is incontrovertible. Their contributions range from primary education to space exploration; from renewable resources to global health; and from national economic health to national resilience. Since the beginning of the 21st century, life sciences research and associated disciplines have demonstrated unprecedented discoveries and benefits. It is however unfortunate that individuals and groups have used or vowed to use these same advances and innovations for acts of terror. The charge to protect the biological material, technology, expertise, information and the way of science does not rest on any one party, but is a shared responsibility.
- 10:15**      **Break**
- 10:30**      **Agricultural bioterrorism: An FBI perspective** | Steven Goldsmith
- 11**          **The federal Select Agent Program’s approach to personnel suitability: A model for biosecurity for emerging biotechnologies** | Samuel Edwin and Mark Pagala
- This presentation will provide an overview of the Federal Select Agent Program (FSAP), which regulates the possession, use and transfer of select biological agents and toxins that have the potential to pose a severe threat to public; animal or plant health; or to animal or plant products. It will also discuss how personnel suitability is handled within the program for access to select agents, including topics such as security risk assessments and suitability requirements.
- 11:30**      **Synthetic biology: Research applications, possibilities and challenges** | Karmella Haynes
- This presentation will highlight important, fundamental methods that provide the potential to change the behavior of living cells at will. For instance, CRISPR represents the most recent significant leap toward our ability to edit any DNA sequence in any organism. This presentation will provide a basic primer on CRISPR and other technologies. The goal of the presentation is to provide a general audience with accessible technical knowledge to inform discussions about biosecurity.
- Noon**        **Sponsors’ recognition | Light refreshments and snacks provided**

## Afternoon Theme: Biosecurity and research opportunities

### 1 p.m. **What's next after the National Academies of Sciences Report on Gene Drives?** | James Collins

In June 2016, the U.S. National Academies of Sciences, Engineering, and Medicine released its report, "Gene drives on the horizon: Advancing science, navigating uncertainty, and aligning research with public values." The report addressed the rapidly emerging area of CRISPR-Cas9 based gene drive research with an eye to the ethical, legal, and social implications of the refinement and application of the technology. After publication of the report, the field of gene drives continued attracting significant attention as discovery and possible application advanced. This talk will review issues raised by the original report along with ongoing advances in the science of CRISPR-Cas9 based gene drives and the complex ethical, legal, and social issues raised by possible applications of this technology.

### 1:20 **Biosecurity in Native American communities** | Otakuye Conroy-Ben

Biosecurity in Indian country is a largely unexplored, but important safety concern. The definition of biosecurity may be different from tribe to tribe, representing the diverse lifestyles and priorities of sovereign nations. We will discuss biosecurity history, protocols, and risks in Native American communities.

### 1:40 **Strategies for facile detection, identification and mitigation of emerging infectious disease** | Neal Woodbury

Recent advances in peptide array technologies have resulted in the ability to create 0.5 cm<sup>2</sup> chips with >105 peptide sequences on them. We use these peptide arrays to profile the human immune system. The resulting profile can be used to detect and identify disease as well as to predict potential antigens for use in the generation of vaccines. Applications to several different infectious diseases will be discussed as will the relationship to biosecurity monitoring.

### 2 **Group discussion: Biosecurity from differing perspectives** | James Collins, Otakuye Conroy-Ben and Neal Woodbury

- How can we better acknowledge and reward stewardship in biosecurity?
- What are the consequences of missing security issues?
- Who should be included in conversations about gene drives and biosecurity?

### 2:10 **The iGEM competition: A testbed to evaluate norms and practices related to risk** | Megan J. Palmer

The International Genetically Engineered Machine competition (iGEM) is the largest educational program in genetic engineering, or "synthetic biology," involving hundreds of student teams from dozens of countries across the world every year. Over the last 13 years, iGEM has developed multiple strategies to foster attention to biosafety, biosecurity and social scientific responsibility across institutional and international borders. I will also discuss early work on a project to leverage iGEM as a testbed for systematically discerning which factors contribute to the cultivation of norms and practices related to risks.

### 2:35 **Group discussion: Questions at iGEM** | Megan J. Palmer

- How can biosafety and biosecurity professionals assist iGEM?
- How is safety and security achieved at the global level (e.g., young, well-intentioned actors)?
- What iGEM experiments are taking place and what resources are available to learn more?

### 2:45 **Break**

**3 Security concerns with emerging technology: Creating learning feedback loops | Sam Weiss Evans**

Are our systems for governing security concerns in biology working? How do we know, and how can we improve those systems? In this talk, I explore the processes through which we change what counts as a security concern, and who is involved in those processes. I make the case for the role of learning feedback loops in understanding the need for broader policy change, and the importance of personal networks in determining whether novel areas of research constitute security concerns.

**3:25 Sequence-informed, real-time, virus surveillance | Matthew Scotch**

This talk will focus on the use of genome sequences for pathogen surveillance. It will cover how techniques such as phylogeography can help public health agencies identify and study pathogens including their evolution and spread. It will also introduce how next-generation sequencing can be used for real-time surveillance of pathogens including those from natural and unnatural outbreaks.

**3:50 Group discussion: Questions about emerging technology and genetic evolution | Sam Weiss Evans and Matthew Scotch**

- How are internal feedback loops incorporated in the governance of emerging biotechnologies?
- What are the limitations in creating governance strategies with limited timeframes built into them? What are the benefits?
- What kind of governance options should we design and deploy for emerging biotechnologies?
- Given limited resources in public health or pathogen surveillance, which infectious agents should be targeted for genome-informed, real-time surveillance?
- How would genome-based, real-time surveillance be implemented at the local, state, federal or international level?

**4 Do-It-Yourself | DIY: What to know, who are the players, and how to help?**

Patrik D'haeseleer and Maria Chavez

For more than ten years, the DIY Biology Community has grown from a few garage labs and an online forum to more than 50 DIY Biology groups across the U.S., and nearly 200 across the world. The projects have grown as the community has evolved and is now using the latest in cutting-edge technology, such as CRISPR gene editing, and tackling larger problems, but could use more support from the professional community. Safety is a key consideration to keep our members and communities safe. Engagement with biosecurity professionals helps this growing group to address risks and learn best practices, without stifling innovation or enthusiasm.

**4:30 Group discussion: Questions about DIY | Patrik D'haeseleer and Maria Chavez**

- How can biosafety and biosecurity professionals assist DIY and non-traditional science?
- What are some examples of DIY taking place in local communities and organizations?
- What DIY experiments are considered to be a biosecurity risk and what are some biosecurity measures that groups could take to minimize these risks?

**4:40 Open discussion**

- How do we encourage reporting accidents and near misses with emerging technologies?
- What are some of the challenges with synthetic biology?
- What happens if institutions miss important issues when reviewing research projects?
- What key components could be used to establish a biosecurity credential?

**5 Closing remarks and end of day one**

# Arizona Biosecurity Workshop: Day 2

Friday, Dec. 8, 2017 | Arizona State University | Tempe, Arizona

Memorial Union | Room 221, Arizona Ballroom

Note: Speakers, presentations and presentation times are subject to change.

## Morning Theme: International perspectives and biosecurity in action

8 a.m. Program begins

8:05 ASU welcome address: Day 2 kickoff | Cheryl Conrad

8:15 Day one recap and thank you's | David Gillum, Shelley Jones and Phillip Bates

8:20 Global biosecurity norms | Gigi Gronvall

This talk will describe the international norms surrounding biosafety and biosecurity, and options to increase political attention and funding towards their development. A specific point for discussion is what common expectations nations should have regarding other nations' biosafety practices for research that has the potential, in the event of an accident, to lead to international spread. Such common expectations between nations do not yet exist, but the World Health Assembly has a role to play, such as by updating their resolution WHA58.29, which came about after SARS laboratory accidents. This talk will emphasize that international biosecurity norms need to be bolstered and promulgated; this is important in the aftermath of a disappointing Biological Weapons Convention meeting in 2016 and the erosion of the international norm prohibiting chemical weapons use.

8:45 International perspectives on biorisk management | Ben Brodsky

A broad and diverse solution space exists to identify and control biosecurity risks. Identification of the optimal biosecurity solution is driven by several factors beyond the nature of the risk itself. This presentation will focus on the lessons and insights the International Biological and Chemical Threat Reduction (IBCTR) program at Sandia National Laboratories has accumulated over the past decade, through its cooperation with partners around the world on laboratory biosecurity. The application of these lessons to shaping future approaches to addressing emerging, globally relevant challenges to biosecurity will be considered.

9:10 Biosecurity in Mexico | Luis Alberto Ochoa Carrera

The increase in infectious disease detection capacity has not been paralleled by an increase in biosecurity or even biosafety measures, specifically in low-resource countries. These countries face several challenges that involve the lack of funding and in many cases limitations in basic and more advanced training. Independent of political factors, countries with shared borders have common interests based on epidemiological surveillance; effective and efficient transfer of technology; protection of agricultural and economic interests, including farming and food production; and preservation of shared natural resources.

9:35 Group discussion: Questions about global biosecurity | Gigi Gronvall, Ben Brodsky and Luis Carrera

- How is biosecurity promoted at the international level?
- What are the main challenges facing global biosecurity?
- What strategies are needed to address emerging technologies in geographically and economically different areas of the world?

9:45 Break

- 10 Risk assessment framework: A pharmaceutical perspective | Barbara Owen**
- Effective risk assessment is the foundation of a successful biorisk management program. At Merck & Co., Inc. we created an electronic biorisk assessment tool called BAR (or Biorisk Assessment and Repository) that integrates both biosafety and biosecurity concerns. The BAR form consists of five sections: hazard identification, regulatory applicability, unit operation impact, risk mitigation and risk management strategy. This presentation will highlight how biosecurity was integrated into the company biorisk management framework and biorisk assessment (BAR) tool. Following the presentation there will be a group discussion about biorisk assessment and implementation as it relates to biosecurity.
- 10:25 Assessing biosafety risk: Gain of function as a case study | Ryan Ritterson**
- In 2015, Gryphon Scientific was asked to conduct a risk and benefit assessment of so-called “Gain of Function” studies on influenza and SARS and MERS coronaviruses. For the biosafety risk assessment, Gryphon used a fully quantitative approach to predict the risk of laboratory exposures triggering local and global outbreaks of the pathogens investigated. The key findings and lesson learned from this risk assessment will be presented, including the major role that human error plays in precipitating exposure incidents. Using this assessment as a case study, several current challenges in biosafety risk assessment will be discussed, including data collection gaps that hinder accurate and precise estimates of risk.
- 10:50 Group discussion: Questions about risk assessment | Barbara Owen and Ryan Ritterson**
- What are some of the lessons learned from the avian influenza controversy?
  - How is a culture of safety encouraged when people are afraid to report issues?
  - Where should biosafety research and biosafety risk assessment go from here?
- 11 Therapeutic gene editing in humans: Challenges and opportunities | Samira Kiani**
- CRISPR revolutionizes gene editing and is entering human trials. Safety and controllability are important considerations for clinical trials. CRISPR-mediated, transcriptional modulation of genes can be a safer alternative to disruption of genes and can be an enabling strategy for regenerative medicine. I will discuss safety considerations, genetic tools that enable control over when and how CRISPR modulate genes, and showcase applications in animal models to reprogram of tissue fate and function.
- 11:25 Governing risks associated with next generation biological engineering applications | Kenneth Oye**
- The biological engineering field is in the midst of a period of unusually rapid change, driven by the convergence of advanced gene editing methods, improved design tools and integrated data sets. This talk will describe an array of current and emerging applications in agriculture, industry, medicine and environment, and then discuss associated environmental, safety and security effects. Applications will include modifications of fish and livestock; synthesis of fuels; flavors and drugs; SCGT; HGT and xenotransplantation; and gene drives. Approaches to risk governance will include nonbinding guidelines, national regulations and international conventions, with emphasis on the need for adaptive approaches under conditions of uncertainty and controversy.
- 11:50 Group discussion: Questions about emerging biotechnology and human genome editing | Samira Kiani and Kenneth Oye**
- How are risk assessments performed for novel technologies?
  - What is needed to move beyond a list-based method (lists of pathogens) to assess risk?
  - How should research with novel biotechnology be performed safely and how is deliberate misuse prevented?
- Noon Sponsors’ recognition | Light refreshments and snacks provided**

## Afternoon Theme: Biosecurity governance and cybersecurity

### 1 p.m. **U.S. government dual use research of concern and gain of function policies | Kevin Ramkissoon**

Dual use research of concern (DURC) and gain-of-function research that involves the enhancement of transmissibility and/or virulence of potential pandemic pathogens (enhanced PPP research) often raise both biosafety and biosecurity concerns. While such research is important to our understanding of pathogens and disease and can yield results that contribute to the broader base of knowledge that underpins improvements in public health and safety and national security, careful attention must be paid to mitigating potential risks associated with their conduct and communication. This presentation will provide an overview of the "United States Government Policy for the Institutional Oversight of Life Sciences Dual Use Research of Concern" (Sept. 2014) and the "Recommended Policy Guidance for Departmental Development of Review Mechanisms for Potential Pandemic Pathogen Care and Oversight" (Jan. 2017), which aim to help preserve the benefits of certain life sciences research while minimizing potential biosafety and dual use risks.

### 1:25 **Dual use research: Poxviruses | Bertram Jacobs**

Very specific guidelines are in place to deal with Dual Use Research of Concern, but there is some concern that experiments that don't specifically meet the guidelines may still be an issue of (small c) concern. This may be especially important with the advent of the ability to broadly genetically modify model organisms. An example will be given of research using genetically modified mice that might teach how to make a particular human pathogen more pathogenic. Discussion on how a risk mitigation plan was developed, despite the research not meeting the specific DURC guidelines.

### 1:50 **Developing and implementing risk mitigation plans for DURC | Rebecca Moritz**

The United States Government (USG) Policy for Institutional DURC Oversight requires institutions develop risk mitigation plans for research identified as DURC. This presentation will focus on the process the University of Wisconsin-Madison uses to develop and implement risk mitigation plans including the content of currently USG funding agency approved plans.

### 2:15 **Group discussion: Questions about dual use research | Kevin Ramkissoon, Bertram Jacobs, and Rebecca Moritz**

- What complicates the distinction between DUR and DURC projects and why does it matter?
- How should experiments with DUR potential, but not DURC listed projects, be reviewed?
- What are the issues with publishing DUR projects?

### 2:30 **Break**

### 2:45 **The intersection of cybersecurity and biosecurity in facilities performing biological research | Zach Jetson**

In October 2016, the internet experienced one of the largest dynamic denial-of-service attacks. Tens of millions of network requests flooded into a single company from exploited networked video cameras across the globe. This attack caused massive service outages across the U.S., including Netflix, Github, Amazon, Twitter and others. In this talk, I will discuss the necessity of cybersecurity in biological research and address the implications of modern technologies.

### 3:10 **Cybersecurity in select agent facilities | John B. Holcomb**

This presentation will discuss how computer and information technology (IT) security relates to the select agent regulations. It will provide case studies involving a hack into a crime laboratory's heating, ventilating and air conditioning system and two computer breaches. The discussion will also include how IT systems can be enhanced by user-right's management (authorized and authenticated users), updating systems (configuration management and regular patching) and controls that are designed to prevent malicious code.

**3:35 The FBI's perspective on biosecurity and cybersecurity | William So**

Computer hardware and software help to evaluate, direct, communicate and monitor essential aspects of our lives. They are pervasive and have become essential ranging from global commerce to finance and from individual medical care to global research. Resources and effort have been placed on cybersecurity in defense, banking, utilities, etc. — all elements of national security. This presentation will look at potential upstream and downstream vulnerabilities at the interface and continue recent examinations of how cyber security need to be an ingrained element of biosecurity — cyberbiosecurity.

**4 Group discussion: Cybersecurity questions | Zach Jetson, John B. Holcomb and William So**

- What are some resources and tools to evaluate cybersecurity risks?
- What are types of continuous improvements that should be made to avoid complacency?
- What steps should be taken when a cybersecurity issue is discovered?

**4:25 Open discussion**

- What key components are needed to establish a uniform standard for biosecurity?
- What are the potential consequences for not managing DURC properly?
- DUR vs. DURC: How are the risks different?
- Is there a way to learn from existing disciplines to assess biosecurity risk?
- What are some of the risks associated with gene editing technologies and does it matter?

**5 Closing remarks and end of day 2**

## Presenters

**Bates, Phillip E.** | Special Agent, WMD Coordinator, FBI Phoenix

**Brodsky, Ben** | Manager, Risk Management Department, International Biological and Chemical Threat Reduction, Sandia National Laboratories

**Chavez, Maria** | Executive Director, BioCurious

**Collins, James** | Virginia M. Ullman Professor of Natural History and the Environment, ASU

**Conrad, Cheryl** | Assistant Vice President of Research Development, ASU Knowledge Enterprise Development and Professor, Department of Psychology, College of Liberal Arts and Sciences

**Conroy-Ben, Otakuye** | Assistant Professor, Sustainable Engineering and the Built Environment, ASU

**D'haeseleer, Patrik** | Co-Founder Counter Culture Labs

**DeLeon, Michael** | Special Agent in Charge, FBI Phoenix

**Edwin, Samuel S.** | Director, Division of Select Agents and Toxins, Office of Public Health Preparedness and Response, Centers for Disease Control and Prevention

**Evans, Sam W.** | Harvard Kennedy School and Program on Emerging Technologies, MIT

**Gillum, David** | Chief of Staff for EHS, Director of Biosafety and Biosecurity, Institutional Biosafety Officer, and CDC Responsible Official, ASU

**Goldsmith, Stephen** | Biological Countermeasures Unit, FBI WMD Directorate

**Gronvall, Gigi** | Senior Associate of the JHU Center for Health Security, Johns Hopkins Bloomberg School of Public Health

**Guston, David** | School Director and Professor, School for the Future of Innovation in Society, ASU

**Haynes, Karmella** | Assistant Professor, Biomedical Engineering, ASU

**Holcomb, John B.** | DSAT Security Specialist, CDC

**Igras, Leon** | EHS Executive Director, CDC Responsible Official, ASU

**Jacobs, Bertram** | Director and Professor, School of Life Sciences and ASU IBC Chair

**Jetson, Zach** | Information Security, ASU

**Jones, Shelley** | Director of Biosafety, Northern Arizona University and President of the Arizona Biosafety Alliance (AZBA)

**Kiani, Samira** | Assistant Professor, School of Biological and Health Systems Engineering, ASU

**Luoma, Nichol** | Associate Vice President, Sustainability Operations Officer and CPO, University Business Services

**Mendoza, Irene** | Associate Biosafety Officer, Environmental Health and Safety, ASU

**Moritz, Rebecca** | Select Agent Program Manager and ICDUR, University of Wisconsin, Madison

**Ochoa Carrera, Luis Alberto** | Institute for Epidemiological Diagnosis and Reference (InDRE) Ministry of Health-Mexico, and ASU AMEXBIO Partnership

**Owen, Barbara** | Biosafety Officer, CDC Responsible Official, Merck

**Oye, Kenneth** | Political Science and Synthetic Biology Center, MIT

**Pagala, Mark** | Assistant Director, Agriculture Select Agent Services, National Import Export Services, USDA, APHIS, Veterinary Services

**Palmer, Megan J.** | Senior Research Scholar, Center for International Security and Cooperation, Stanford University

**Ramkisson, Kevin** | Health Science Policy Analyst, Division of Biosafety, Biosecurity, and Emerging Biotechnology Policy, Office of Science Policy, NIH

**Ritterson, Ryan** | Gryphon Scientific

**Scotch, Matthew** | Associate Professor, Department of Biomedical Informatics and Assistant Director, Biodesign Center for Environmental Health Engineering, ASU

**So, William** | Biological Countermeasures Unit, FBI WMD Directorate

**Woodbury, Neal** | Director and Professor, School of Molecular Sciences, ASU

# Directions to the Memorial Union

[eoss.asu.edu/mu/about/directions](http://eoss.asu.edu/mu/about/directions)

The Memorial Union (MU) is located at 301 E. Orange St., on the Tempe campus. The meeting will be held in Memorial Union, room 221, Arizona Ballroom.

## MU parking

[asu.edu/parking/maps/tempe-current.pdf](http://asu.edu/parking/maps/tempe-current.pdf)

Visitor parking is available at the Apache Boulevard Parking Structure.

We recommend reserving parking on the Tempe campus ahead of your visit through ASU Parking and Transit Services. Find additional on-campus parking.



## Alternative transportation methods:

[bike.asu.edu](http://bike.asu.edu)

[cfo.asu.edu/transit](http://cfo.asu.edu/transit)

[cfo.asu.edu/shuttles](http://cfo.asu.edu/shuttles)

## Nearby hotels\*

**AC Marriott** | \$269 per night plus tax. 100 E. Rio Salado Parkway, Tempe, AZ 85281.  
480-642-6140.

[marriott.com/hotels/travel/phxac-ac-hotel-phoenix-tempe-downtown](http://marriott.com/hotels/travel/phxac-ac-hotel-phoenix-tempe-downtown)

**Moxy Tempe** (within walking distance) | \$119 per night plus tax (ASU Rate, a limited number of rooms). Without ASU discount, \$159 (Dec. 6) \$129 (Dec. 7) Free airport shuttle if requested. Call to make a reservation and ask for the ASU discount because you are attending the Biosecurity Workshop. 480-968-3451.

[moxy-hotels.marriott.com/hotels/tempe](http://moxy-hotels.marriott.com/hotels/tempe)

**Tempe Mission Palms** | \$164 per night plus tax. Free airport shuttle every 30 minutes starting at 5:30 a.m. Free shuttle to the Memorial Union (conference venue).

[www.destinationhotels.com/tempe-mission-palms](http://www.destinationhotels.com/tempe-mission-palms)

**The Graduate** (closest to conference site) | \$169 per night plus tax, free shuttle to the student union, no airport shuttle. Call or book online.

[www.graduatehotels.com/tempe](http://www.graduatehotels.com/tempe)

**Other nearby hotels** | Google maps: [bit.ly/2gZalyp](https://bit.ly/2gZalyp)

\* Availability and pricing are subject to change. If you work for a government institution or a state school, please ask for the ASU or government rate (if available).