

# ASM Materials Camp®-Teachers



**MATERIALS CAMP®**  
ASM MATERIALS EDUCATION FOUNDATION



**GUIDELINES**



## ASM MATERIALS CAMP<sup>®</sup>-Teachers

The **ASM Materials Camp<sup>®</sup>** for teachers is a week-long professional development experience held every summer focused on enriching, stimulating, and enhancing the technical competence and teaching skills of high school and middle school STEM teachers. Emphasizing common, everyday man-made physical materials, the program shows and provides teachers with hands-on experiences and classroom enrichment labs and demonstrations that are proven to engage students in science, engineering, technology and mathematics.

Primary instructors are a team of experienced high school “Master Teachers”, who have taught materials science courses for many years and helped develop this innovative approach to hands-on learning of applied science principles. Teacher Materials Camp participants reported unanimously that they were: (a) “More confident in explaining complicated subjects”, and (b) “Gained new ideas and approaches to instruction”.

*“I can't say enough about this camp. It provided me with an increased enthusiasm and confidence for my class material. **I can't wait to use just about everything I learned** and to demo all the free items, and purchase some of the things we got familiar with in the workshop...chemical use, propane use, lab procedure techniques...”* Lynne Sojda, Gilmour Academy, Akron, OH Teachers Camp

Since 2002, thousands of high school and middle school teachers have attended ASM Materials Camps held during the summer at universities, community colleges and high schools in the United States and Canada. Educators receive four Continuing Education Units for attending and have the option to receive graduate level credits. They also acquire the curriculum and supplies for their own classroom.

The ASM Materials Education Foundation was founded in 1952 and has been devoted to promoting applied science careers for students and teachers. We fund undergraduate scholarships, numerous educational outreach activities, and operate our award-winning **Materials Camp<sup>®</sup>** program for students and teachers.

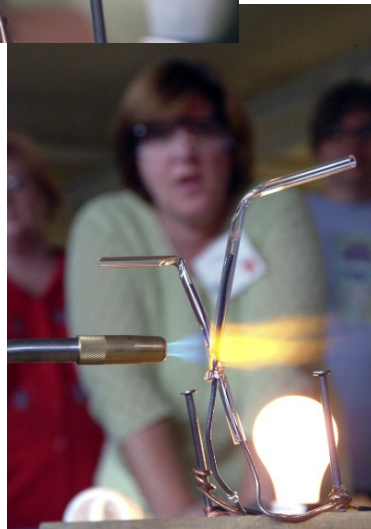
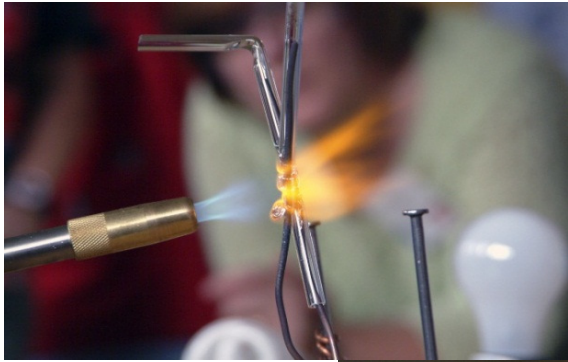
To learn more about the ASM Materials Camp program for teachers, visit [www.asmfoundation.org](http://www.asmfoundation.org) or contact Jeane Deatherage directly at:

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## THE BASICS

### Funding Required

- Commuter teachers camp costs \$20,000 to \$25,000.
- Residential teachers camp runs \$30,000 to \$40,000.

### Role of the ASM Materials Education Foundation

1. Will work with the camp organizing committee from planning to end of camp.
2. Provide the 2 Master Teachers for the camp.
3. Initiate and facilitate planning meetings (via teleconference) to involve:
  - Master Teachers
  - Local organizers
  - Lab manager of the host facility
  - Foundation staff (Administrator of Programs)
4. Serve as finance manager – all expenses are paid through ASM Foundation; i.e.,
  - Purchases made by the Master Teachers – consumables for the camp; handbooks, etc.
  - Master Teachers' salaries
  - Master Teachers' travel expenses
  - Invoices for group meals (lunches & snacks) that are arranged by the local organizers will be sent to ASM Foundation for payment or reimbursement.

**Note:** All funds / contributions for the camp are sent to the ASM Foundation.
5. Camp registration is also centralized, so ASM Foundation will provide a list of registrants periodically to the organizers.
6. Will handle the ordering of camp shirts for participants and volunteers.
7. Will send certificates to camp location for distribution at the “graduation” on Friday / last day.

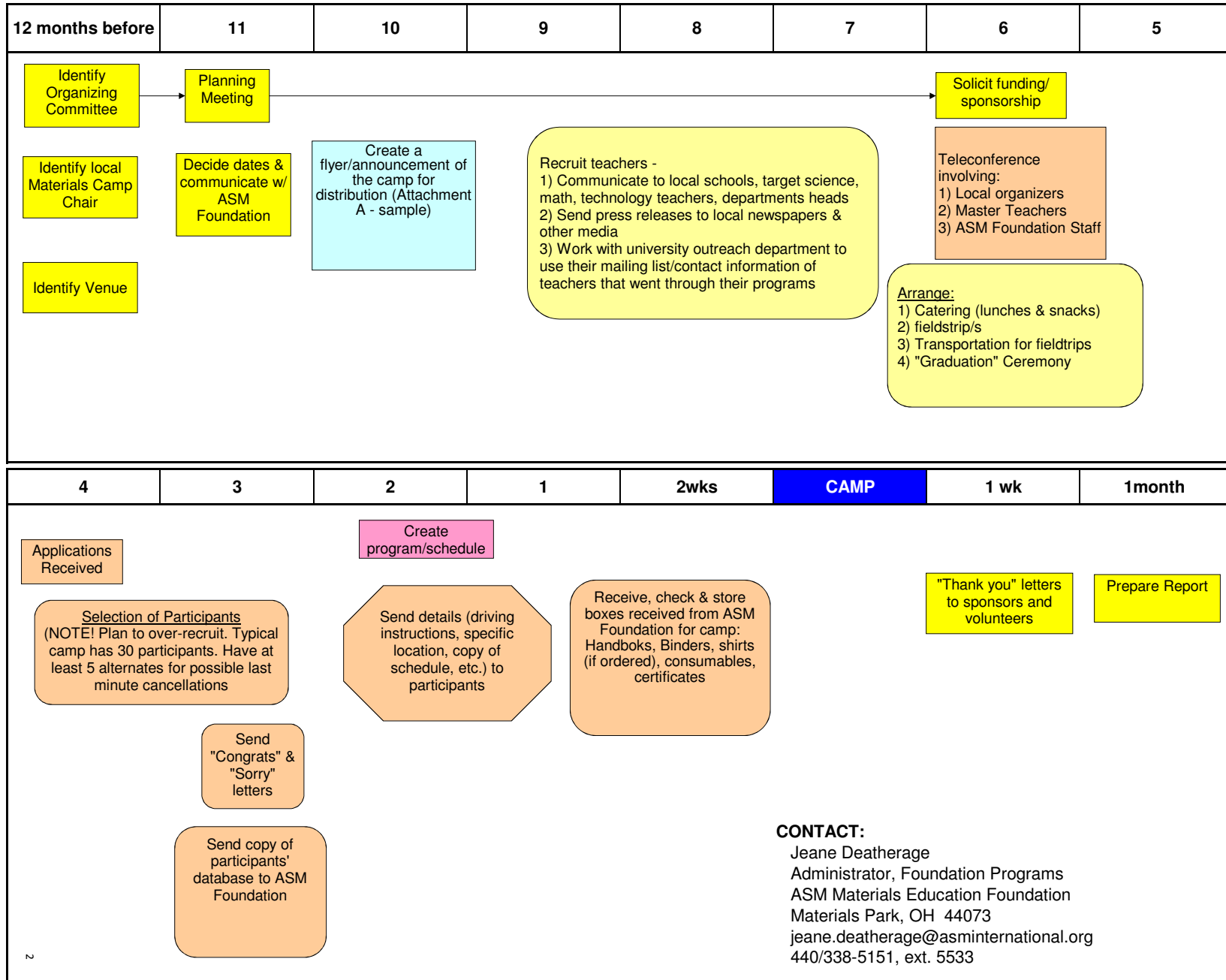
### Role of Host / Local Organizers

1. Provide the facility (per Facility Requirements).
2. See Conference Call Outline – this will provide more insight on the organization of a teachers camp, and what the local organizers need to do or provide.
3. Arrange group lunches.
4. Arrange at least one industry tour.
5. Recruitment of participants.
6. Funding.



# Organizing an ASM Materials Camp-Teachers

## TIMELINE





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## ASM MATERIALS Camp<sup>®</sup>-TEACHERS

### **RECRUITMENT TIPS**

**Overview:** The recruitment of teachers as participants for a local Materials Camp is perhaps the most important, time consuming, labor intensive and most difficult task facing local organizers.

**Keys to Success:** Enlisting a large team to collectively “OWN” this issue. Provide each with a modest achievable goal; a 30-day deadline to act; and recognition for efforts. Start recruitment immediately. Seek 35 participants to account for last minute cancellations. Consider a friendly competition contest.

### **TACTICS TO CONSIDER**

#### **Word of Mouth**

- Ask all past teacher participants from area to assist.
- Ask all past student participants from area to assist.
- Recruit a team of local ASM Chapter members to each make one personal visit, by appointment to their own neighborhood high school.

#### **Higher Education**

- Meet with senior officials of local community college / university to enlist their support and secure their databases of secondary schools / teachers / organizations.
- School of Education
- School of Engineering
- School of Science
- Outreach / Community Relations
- Extension
- Federal Programs
- Admissions / Student Recruitment
- External Affairs

#### **Secondary Education**

- Local School Board of Education: Attend a meeting, seek opportunity to speak and promote

#### **Professional Organizations**

- National Science Teachers Association – state or local chapters: seek promotional support on websites, newsletters
- Teachers Professional Associations: contact and seek assistance, endorsement and promotional help
- Seek help and make alliances and partnerships with other Societies: American Chemistry Association, NACE, SAMPE, TMS, MRS

### **Local Media**

- Send simple flyer, press release or fact sheets to all regional media outlets
- Newspapers: Education reporter, Editorial Board
- Weekly neighborhood newspapers
- Monthly regional news magazines
- Consider low cost / donated small advertisements
- Seek out local talk radio show guest appearances

### **Websites**

- Author and place prominent articles on Chapter website

**MATERIALS CAMP®**

ASM MATERIALS EDUCATION FOUNDATION

**NGSS ALIGNED**

ASM Materials Camps provide practical ideas and strategies that are easy to implement in your classroom.

**“ I cannot say enough about the instructors. Knowledgeable, professional, enthusiastic!**

*This workshop was the best thing I've done since the first teacher camp! I am furiously integrating as many activities as I can into my plans for the coming year!* ”

# Calling All Teachers!

Attend a one week professional development workshop this summer - at no cost to you!

University of Akron | Akron, OH  
July 24 - July 28, 2017

**Who Should Attend?**

- High School Teachers: Science (especially Chemistry and Physical Science), Engineering, and Industrial/Career and Technical Education
- Middle School Teachers: Physical Science
- Pre-Service Science Teachers
- Art, Math, and Community College Teachers as space allows

**Why Attend?**

- Learn how to engage your students using simple, low-cost experiments that you can integrate into your existing lesson plans
- Help your students discover career opportunities in science and engineering

**What's Included:**

4 CEUs, demonstration materials, lunches & snacks

**Graduate Credits Available:**

2 graduate level credits are available through the University of Missouri-Kansas City (optional)

**Schedule:**

8:00am - 5:00pm - Monday - Thursday

8:00am - 3:00pm - Friday

**How to Apply:**

<https://www.surveymonkey.com/r/8XRC7JB>

**Questions?**

Jeane Deatherage, Administrator of Foundation Programs  
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[www.asmfoundation.org](http://www.asmfoundation.org)

This workshop is made possible by the generous financial and in-kind support of:





## ASM MATERIALS Camp<sup>®</sup>-Teachers

### *Materials Science and Technology*

#### Overview of Curriculum

##### **Background**

The program is based on past experiences in the areas of curriculum development, teacher training and student programs in Materials Science developed at the University of Washington and Edmonds Community College and supported by the National Science Foundations Advanced Technology Education program. These programs have demonstrated that Materials Science is an excellent tool to bring together academic and vocational instructors in a common goal of exciting students about science, technology and engineering.

##### **Philosophy**

Materials Science excites students' interest because the student has everyday, hands-on experience with materials. Thus, materials topics are great motivators in any engineering, technology or science course. Materials are also a very important and an integral part of the manufacturing process.

##### **Curriculum**

During this one-week workshop, teacher participants will learn the basics of Materials Science Technology as taught at the high school level. They will work hands-on with metals, ceramics, polymers and composites, and will develop a greater appreciation for the importance of these materials to modern life. The teachers will see how this heavily project-based course excites students to learn science concepts as they complete projects of personal worth to them. Whether teachers use the information and concepts as a basis for teaching their own MST course or merely infuse the concepts into an existing science course to increase relevancy, they will finish the week prepared to make some important instructional changes as a result of their participation.

## **SOLIDS**

##### **Topics**

- Importance of materials
- Four categories of solids
- Simple chemistry made easy
- Chemical bonding
- Periodic Table of Elements – it can be useful and fun to learn
- Oxidation-reduction

### **Experiments/Labs**

- Identification of Materials
- Formation of Crystals
- Destructive Testing
- Activity Series of Metals
- Oxidation/Reduction of Copper

## **METALS**

### **Topics**

- History of metals and use
- Properties of metals
- Mechanical properties
- Effects of heat treating
- Types of alloys; alloying techniques
- Phase diagrams
- Testing metals
- Manufacturing processes

### **Experiments/Labs**

- Rolling a Coin
- Drawing a Wire
- Alloying Copper and Zinc
- Actual Cost of a Penny
- Making a Light Bulb
- Making Tin-Lead Solder
- Annealing Copper
- Powder Metallurgy
- Lost Wax Casting

### **Project**

- Making sterling silver jewelry via lost wax casting techniques

## **CERAMICS/GLASS**

### **Topics**

- Ceramics are crystalline solids
- Ionic and covalent bonds
- Glass properties are different: amorphous structure
- Manufacturing processes

### **Experiments/Labs**

- Forming, Firing, and Glazing Clay
- Thermal Shock
- Glass Bending and Blowing
- Glass Batching and Melting
- Dragon Dribble/Dragon Tears
- Coloring Glass
- Ceramic Slip Casting

### **Project**

- Making Raku
- Melt and pour liquid glass

## **POLYMERS**

### **Topics**

- Classification of polymers
- Altering chemically or with additives
- Recycling concerns
- Chemical changes through cross-linking
- Synthetic polymers & chemistry involved
- Historical developments
- Manufacturing processes

### **Experiments/Labs**

- Cross-Linking a Polymer
- Polymer Identification
- Making Nylon 6-10
- Latex Rubber Ball
- Memory in Polymers
- Epoxy Resin Cast
- Polymer Foam Creations

### **Project**

- Slime

## **COMPOSITES**

### **Topics**

- Types of composites and categories
- Strength-to-weight ratios
- Strength measuring, testing, altering
- Wood and concrete: traditional composites
- Fiber reinforced composites
- Graphite and Kevlar fibers

### **Experiments/Labs**

- Stressed-Skin Composites
- Compression and Tension in a Bending Beam
- Using Portland Cement to Make & Test Concrete
- Hand Lay-Up of a Glass Fiber Reinforced Polymer
- Plaster of Paris Matrix Composite
- Laminated Wood Beams



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# ASM Materials Camp®-Teachers

## TYPICAL SCHEDULE

ASM Materials Camp-Teachers is a proven program that strengthens the curriculum in Science, Technology, Engineering and Mathematics (STEM) at the secondary level. By introducing teachers to the engineering professions through Materials Science, we influence students for years to come. Materials Science excites students' interest because the student has everyday, hands-on experience with materials. Thus, materials topics are great motivators in any engineering, technology or science course. Materials are also a very important and an integral part of the manufacturing process.

This international program is offered by the ASM Materials Education Foundation, in fulfillment of its Mission: "To excite young people in materials, science, and engineering careers." Since 2002, ASM Materials Camps have introduced thousands of high school teachers to hands-on learning about the role of materials in our daily lives. These week-long professional development workshops are held on college campuses, high schools and community colleges throughout the United States and Canada during the summer. For teachers, this is an excellent opportunity to re-visit science principles, do experiments and bring new lessons into the classroom.

The program is based on past experiences in the areas of curriculum development, teacher training and student programs in Materials Science developed at the University of Washington and Edmonds Community College and supported by the National Science Foundation's Advanced Technology Education program. These programs have demonstrated that Materials Science is an excellent tool to bring together academic and vocational instructors in a common goal of exciting students about science, technology and engineering.

During this one-week workshop, teacher participants learn the basics of Materials Science Technology (MST) as taught at the high school level. They work hands-on with metals, ceramics, polymers and composites, and develop a greater appreciation for the importance of these materials to modern life. The teachers see how this heavily project-based course excites students to learn science concepts as they complete projects of personal worth to them. Whether teachers use the information and concepts as a basis for teaching their own MST course or merely infuse the concepts into an existing science course to increase relevancy, they finish the week prepared to make some important instructional changes as a result of their participation.

The camp is FREE for the teacher attendees. For their participation, they receive 4 Continuing Education Units (CEUs); they can also opt for 2 graduate level credits. They are also provided with curricular tools in both digital (CD ROM) format and print; supplies needed to replicate some of the classroom activities at their school; a one-year membership in ASM International; and access to the time and talents of numerous local engineers and scientists.

<b>Monday,</b>		
8:00 AM	<b>Registration</b> ▪ Check attendance against roster	Organizers/Master Teachers
8:30 AM	<b>Welcome</b>	Organizing Committee & Sponsors
8:45 AM	<b>Brief Introductions</b>	Master Teachers
9:00 AM	<b>Intro Experiments – SOLIDS</b>	
10:00 AM	<b>BREAK</b>	
10:15 AM	<b>Intro Experiments</b>	



12:00 PM	LUNCH	
1:00 PM	Intro Experiments	
3:00 PM	<b>BREAK</b>	
3:15 PM	Intro Experiments	
5:00 PM	Adjourn	
<b>Tuesday</b>		
8:00 AM	Metals Unit	
10:00 AM	<b>BREAK</b>	
10:15 AM	Metals Unit	
12:00 PM	LUNCH	
1:00 PM	Metals Unit	
3:00 PM	<b>BREAK</b>	
3:15 PM	<b>METALS</b>	
5:00 pm	Leave for home	
<b>Wednesday</b>		
8:00 AM	CORROSION	
10:00 AM	<b>BREAK</b>	
10:15 AM	Ceramics/Glass	
12:00 PM	LUNCH	
1:00 PM	Ceramics/Glass	
3:00 PM	<b>BREAK</b>	
3:15 PM	Ceramics/Glass	
5:00 PM	Adjourn	Insert fieldtrip if one is arranged
<b>Thursday</b>		
8:00 AM	Plastics, Composites	
10:00 AM	<b>BREAK</b>	
10:15 AM	Plastics, Composites	
12:00 PM	LUNCH	
1:00 PM	Plastics, Composites	
3:00 PM	<b>BREAK</b>	
3:15 PM	Plastics, Composites	
5:00 PM	Adjourn	Insert fieldtrip if one is arranged (if not scheduled on Weds)
<b>Friday</b>		
8:00 AM	Lab completion	
10:00 AM	<b>BREAK</b>	
10:15 AM	Lab completion	
1:00 PM	<b>GRADUATION LUNCH &amp; PRESENTATION OF CERTIFICATES</b>	
3:00 PM	<b>END OF PROGRAM</b>	



## ASM Materials Camp®-Teachers

### Host Facility Requirements

#### Lab Equipment

- Furnaces/ovens that go to at least 1000°C and preferably to 1050°C
  - 1 larger (about 12" x 12" x 10") **or** 2 smaller (about 8" x 8" x 8")
  - digital or programmable – will be used for metals and ceramics/glass
  - front loading
- Tongs, gloves, and face shields for hot work using the furnaces
- Bunsen burners or propane torches – at least 6
- Benches with a couple of vises with a method of attachment (C-clamps for example)
- Assorted Glassware – beakers, graduated cylinders, test tubes
- Fume hood – desirable but not crucial
- 15 amp, 120 volt circuits for iron wire demo
- 2 Ring stands
- Bench-tops/counter space for up to 30 participants – preferably high temp and chemical resistant
- Safety glasses
- Hot plates – preferably ceramic top and metal coil (like a stove-top) – 2 of each would be great
- Electronic scales – 2 that go to decigrams and 1 to centigrams – capacity of at least 200 grams
- Variac – 0 to 140 volts with 10 or 15 amp fuse
- Extension cords
- C-clamps - at least 2
- Basic hand tools – hammer, pliers, screwdrivers (Harbor Freight quality)
- 5 gallon plastic buckets – 2
- Sink with running water
- Rolling mill if possible (with a method of attachment such as C-clamps)
- A large rolling cart for transporting materials between the storage area, classroom, and lab area.

Master teachers will need to discuss the logistics and feasibility of the raku project with the person in charge of the local lab facilities.

**Classroom** - for discussion/lecture/demos - for the exclusive use of the camp during the week, including evenings as the teachers leave quantities of materials at their desks overnight

- Overhead projector
- Computer projection unit
- Flexcam or Elmo or Vision Viewer
- Internet access including YouTube
- Whiteboard or chalkboard
- Table/counter for demonstrations in front of the room
- Seating for 32+
- Since the camp is held in the summer, classroom must have working air conditioning and working thermostat.

**General**

- On-site readily available, experienced lab assistant with access to all facility resources
- Assistance with shipping materials at the conclusion of the camp
- Assistance with set-up on the weekend immediately preceding the camp
- Temporary storage area to accommodate pre-camp delivery of 20+ boxes of consumable supplies/equipment
- Storage/prep area for supplies and equipment during week of camp
- Reliable and affordable food service for morning and afternoon beverage/snack break
- Access to nearby (5-minute walk) diverse lunch/dinner options
- Hotel with exercise facilities, complimentary breakfast and shuttle van service (to airports, laboratory/classrooms) for residential camps

## Conference Call Outline

Camp Location:

Camp Date:

Hosts / Volunteers / Master Teachers

<b>Volunteer / Host Names</b>	<b>Affiliation/Role</b>	<b>Email</b>	<b>Cell Phone #s</b>
<b>Master Teachers</b>			
<b>ASMF</b>			
Jeane Deatherage	Administrator	Jeane.deatherage@asminternational.org	

Discussion Points/Questions:

1) Facility/Equipment Requirements (Refer to separate document on Facility Requirements)

List items that are available for use at Camp:

Questions or uncertainties about items on the list:

List items that need to be found for use at Camp:

- Could pictures of the facility be sent to the Master Teachers?

2) Camp Details:

- Date Master Teachers arrive:
- Date and Time to begin set-up:
- Volunteer/s to help with set-up:
- Parking for master teachers and participants:
- Will the camp have exclusive use of the rooms for the week? Can they be locked?
  - Participants leave their notebooks and other items overnight.
  - What is the distance between the classroom and the lab? Is a rolling cart available?

- Master Teachers arrive early and leave late each day. For early morning arrivals and security of facility, would keys be made available to Master Teachers?
- Name and location of nearby stores for local purchase of materials: (circle available stores)
  - Wal-Mart
  - Target
  - K-Mart
  - Home-Depot
  - Lowe's
  - Grocery Store
  - Harbor Freight
- Location and storage of incoming supplies:
  - Need a locked space for 15 to 20 boxes
  - Master Teachers will need access to all of the supplies on the weekend set-up day
  - Shipping address to be used including to whose attention:
- Internet access
  - Crucial for Master Teachers
  - Is it also possible for the participants?
- Projection system – would like to test it out on set-up day
- Name tags: whose responsibility – master teachers or local organizers?
- Access to printer and copier
- Snacks (morning and afternoon) and lunch at noon
  - Local organizers/hosts arrange and send bill or receipts to ASM Foundation (if not pre-arranged to be covered by the host or by a local sponsor).
  - Suggestions/options
- Friday Lunch/"Graduation"
  - Make it a little more "special" than what was arranged during the week
  - Invite VIPs
    - sponsoring chapter members
    - financial supporters
    - field trip hosts
    - host site school administration
    - school administrator/counselor of schools with 2 or more enthusiastic participants (to be identified by Tuesday afternoon)
  - Discussion of general format and time

### 3) After the camp - boxing up, storage, and shipping

- Could volunteers be available to help?
- Need a secure location for storing leftover supplies and equipment for future camps
- The stored materials will need to be available on the weekend prior to the start of camp the following year



- Need local volunteer or host site to ship out boxes via UPS or Fed Ex by the following Monday after camp

#### 4) Suggestion for a nearby hotel where Master Teachers can stay

- Best location that would allow good rates, safety, and accessibility to facility and shopping for supplies
- Are special rates available?

#### 5) Field Trip

- What opportunities are available?
  - One is sufficient
  - It is best if something is being made or actively done
- Scheduling - should be limited to ½ day as possible
  - Wednesday is best but Thursday will also work
  - Take travel time into consideration
  - Transportation

#### 6) Media

- Contact and invite local media outlets such as newspapers, TV stations, etc...
- Give them background about the camp and ask if they would do a “feature” during the week of camp

#### 7) Volunteers/Mentors

- Local ASM chapter members are encouraged to visit camp and interact with the teachers during lab time and breaks
- Help from volunteers is also appreciated during set-up the weekend before camp and during Friday afternoon’s clean-up and packing

#### 8) Special considerations for planned activities:

- Oobleck activity – Monday
  - Need outside area where a messy activity will not disturb others.
- Raku Project – Friday
  - Need furnace located near an outside access door or well-vented hood
  - Furnace needs to be front-loading (see equipment list)



# ASM MATERIALS EDUCATION FOUNDATION<sup>SM</sup>

If you have questions, please contact:

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ASM Materials Education Foundation  
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Or visit:

[www.asmfoundation.org](http://www.asmfoundation.org)

