This **Design Challenge Team Notebook** is a reference manual - alphabetical by topic - that should prove helpful to the team from the beginning to the end of their participation in the Design Challenge program. All the information contained herein is available for download from the program website. Additional forms, applications, and samples are also available online. For any questions, please contact TSGC at designchallenge@tsgc.utexas.edu.

**Summary of Design Challenge:** A group of 3-6 students continue a project with their Faculty Advisor and complete the Application process. Once accepted by TSGC, the members work through Team Organization, contact their NASA Mentor, and begin submitting weekly Tuesday Tag-Ups. Throughout the semester the team will work towards accomplishing the milestones listed in the Timetable, with potential help from Collaborators and Field Experience. The team will first work on Level 1 including Patch Design, next on Level 2 (Midterm), and then toward Showcase and completing Level 3 (Final Report & Video). Money may be earned, received, and spent by the team for the project throughout the semester; these are fixed amounts; TSGC does not reimburse for expenses. Teams may also participate in Outreach to enhance their funding and experience. Reports throughout the semester should follow the Writing Guidelines. At Showcase, the teams compete for Scholarships.

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Application Process: The Design Brief communicates a new team’s intention to work on a particular topic and introduces the team to TSGC. Acceptance of the application by TSGC completes Base Level and sets the stage for participation in the TSGC Design Challenge.

- **First-semester teams** submit the Design Brief electronically to identify team members, department information, 1st & 2nd choice topics, and submit curriculum vitae.
- **Returning teams** will submit team changes to reinstate the team for continuation in the program.

Team Pre-requisites: All team members must meet the eligibility requirements for the call and institution in which they are enrolled and must meet NASA requirements for the design topics. Each eligible student may only participate on one team. Faculty may support more than one team.

**TEAM RESPONSIBILITIES**

<table>
<thead>
<tr>
<th>NEW FIRST-SEMESTER TEAMS WILL:</th>
<th>RETURNING SECOND-SEMESTER TEAMS WILL:</th>
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<tbody>
<tr>
<td>§ Organize a team</td>
<td>§ Re-establish team membership</td>
</tr>
<tr>
<td>o Recruit a Faculty Advisor</td>
<td>§ Review the new program notebook</td>
</tr>
<tr>
<td>o Name the team</td>
<td>§ Report any team changes</td>
</tr>
<tr>
<td>o Determine the student Team Leader</td>
<td>§ Submit a new project timeline</td>
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<tr>
<td>and Team Organization</td>
<td>§ Report any Outreach undertaken</td>
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<tr>
<td>§ Review this Team Notebook</td>
<td>§ between semesters</td>
</tr>
<tr>
<td>§ Determine 1st &amp; 2nd project choices</td>
<td>§ Resume Tuesday Tag-Ups with</td>
</tr>
<tr>
<td>§ Submit the Design Brief application</td>
<td>Faculty Advisor, Mentor, and TSGC</td>
</tr>
<tr>
<td>§ Once accepted, begin weekly Tuesday Tag-Ups with Faculty Advisor, Mentor, and TSGC</td>
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<tr>
<th>BASE LEVEL</th>
<th>DEADLINE:</th>
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<tr>
<td>§ Design Brief application. The electronic application form can be accessed here: <a href="https://goo.gl/yctLSn">https://goo.gl/yctLSn</a></td>
<td>Returning team: Tuesday, January 28</td>
</tr>
<tr>
<td>§ Submit a one-page resume/c.v. for each new team member</td>
<td>New teams: Friday, January 31</td>
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</table>

**AWARD:** None

Notes:
- Notification of acceptance will be conveyed after the deadline.
- Not all teams that apply may be accepted. Space for spring 2020 is extremely limited. Priority is given to senior-level capstone classes. Other considerations include maximizing the number of mentors, topics, and schools involved with the program. Additional considerations and restrictions may apply.
- Funding note: any federal budget delay or government shutdown will impact TSGC funding and could impact timeliness, availability, and amount of team earnings and scholarship dollars. Federal funding is not guaranteed.
LEVEL 1 requires that the team seek ways to collaborate with individuals outside the primary team, beyond your group of students, Faculty Advisor, and NASA Mentor. Why?

Outside collaboration is important because it brings the team new ideas on how to approach the design project: drawing on the experience of experts, exploring ideas of others, and gaining new design perspectives brings dimension and integrity to the project.

<table>
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<tr>
<th>WITH WHOM?</th>
<th>WHY?</th>
<th>HOW?</th>
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<tr>
<td>Anyone who can offer the team advice, assistance or a new perspective on any aspect of the design effort, such as:</td>
<td>Proven benefits include:</td>
<td>Finding people to collaborate with the team is as easy:</td>
</tr>
<tr>
<td>- Students from another design team, another academic discipline, or another university</td>
<td>- Design focus gained from exposure to more diverse levels of experience</td>
<td>- Talk to people in the community whose interests align with your project</td>
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<tr>
<td>- Graduate students or postdocs with expertise in your topic’s research area</td>
<td>- Outside inspiration motivates the team</td>
<td>- Search the web for related research to find unexpected sources and contact authors</td>
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<tr>
<td>- Other Faculty, Technicians or Specialists within the university</td>
<td>- Background information used in decision making is broadened</td>
<td>- Meet with your collaborators; take a field trip or invite them to a team meeting</td>
</tr>
<tr>
<td>- Experts outside your university from the academic or industry community</td>
<td>- Team perspective is more diversified adding more validity to the solutions the team presents</td>
<td>- Communicate openly and often among teams members and collaborators</td>
</tr>
<tr>
<td>- Primary and Secondary Teachers for outreach ideas</td>
<td>- Creative and multi-disciplinary solutions are generated</td>
<td>- Create a team Facebook page to share information and progress</td>
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Each team is required to have a Faculty Advisor to oversee team progress and advise the team. This is an easy requirement to fulfill since most teams are already enrolled in a course led by member of your institution’s faculty. Teams should work efficiently with their advisor, since working with the Design Challenge team will add a time commitment to the advisor’s already busy schedule.

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<tr>
<th>ADVISOR ROLE</th>
<th>EXPECTATIONS</th>
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| **FACULTY MEMBER** | - Instructor of an organized course or independent study  
                             - Assures the team is academically capable and prepared for project  
                             - Facilitates team/mentor communication for discussion of scope of research and Mentor’s expectations  
                             - Helps direct and review the team’s report writing  
                             - Verifies that design activity is the work of the student team members and that all members are contributing  
                             - Attends TSGC Design Challenge Showcase with the team, or designates a representative from the team’s institution to attend on his/her behalf |
| **PRINCIPLE INVESTIGATOR** | - Oversees initial set up and review of team funding  
                                     - Ensures that the team uses awarded funds as intended  
                                     - Keeps track of funds earned by the team to avoid overspending  
                                     - Identifies an account within the department to support the team in the interim between award payments  
                                     - Reinforces that team members should not use their personal funds for team expenses  
                                     - Submits invoice in a timely manner to TSGC for award earnings  
                                     - Instructs the team on departmental policies for travel arrangements, use of private car, per diem, car rental, tax exemptions, etc. |
| **PROJECT MANAGER** | - Helps the team focus on technical aspects of the design as it moves toward meeting the Level requirements in a timely manner  
                                   - Evaluates the team’s work for meeting Mentor expectations and high academic standards  
                                   - Helps with interpreting reviewer comments and suggesting solutions  
                                   - Remains attentive to team progress: aware of what the team is submitting to TSGC including Tuesday Tag-Ups; brings any technical, financial or personnel issues to the attention of TSGC |

**NOTE:** Each semester, for NASA reporting purposes, we need the Faculty Mentor to provide a cost-share estimate for his/her work with the Design Challenge team. A line for this purpose is included on the team invoice form.
Teams are encouraged to use the Design Challenge as an opportunity to gain Field Experience, taking advantage of the opportunity to explore beyond their campus community. Teams are encouraged to use earnings for travel and per diem associated with team field trips.

A team trip may be taken to enhance the team’s knowledge of:
- Design project
- Associated research
- Careers & workplace
- STEM related activities
- Collaboration opportunity
- Invention & design

Acceptable ways to use field experience funds include:
- NASA JSC or NASA-contractor facility visit
- Project-associated tour of a research facility
- Explore degree or career opportunities
- Travel to meet with Mentor or Collaborators
- Attend a professional-level meeting or conference

Check with your Faculty Advisor or TSGC if you have questions about whether or not a field trip is acceptable for use of team earnings.

Check with your department accounting contact in advance to find out how to be reimbursed for any travel-related charges you incur. And be sure to let your department’s administrative desk know that the team intends to travel – there may be forms that you will be required to complete before your trip.

Teams are encouraged to document the field experience with photos. Include a report and photos as an Appendix to any Level report, post to the team’s online presence, and enhance your team’s position for Showcase awards. During the program milestone called Level 1, a first-semester team’s research and design solutions will begin to take form; a second-semester team advances work started the previous semester.
- **First-semster teams** communicate design project research with the submission of a Level 1 Proposal to TSGC.
- **Second-semster teams** submit an update on how they propose to continue work on the project via submission of a Level 1 Summary of Work report to TSGC.

### LEVEL 1 - RESPONSIBILITIES

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<th>SEMESTER I</th>
<th>SEMESTER II</th>
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<tr>
<td>- Submit a formal proposal (PDF format)</td>
<td>- Submit any updates to the team and individual photos and patch design</td>
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<tr>
<td>- Adhere to Writing Guidelines</td>
<td>- May include an Outreach report</td>
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<tr>
<td>- Include all necessary sections</td>
<td>- Continue weekly Tuesday Tag-Ups</td>
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<td>- Demonstrate interaction with Mentor</td>
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<td>- Indicate strategies for Collaborators</td>
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<td>- State design objective &amp; specifications</td>
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<td>- Present basic design plan/methodology</td>
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<td>- Present draft timetable &amp; budget plan</td>
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<td>- List any accomplishments to date</td>
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<td>- Document references &amp; resources</td>
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<tr>
<td>- Submit weekly Tuesday Tag-Ups</td>
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<tr>
<td><strong>LEVEL 1</strong></td>
<td><strong>DEADLINE</strong></td>
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<tr>
<td>- Proposal (Semester I teams)</td>
<td>Friday, February 21, 2020</td>
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<tr>
<td>- <strong>Digital photographs</strong> of: (a) head shot of each team member individually, and (b) a group photo of the entire team</td>
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<td>- <strong>Patch design</strong> and description (within the report). Also include the patch design as a separate high-quality file attachment</td>
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**TEAM AWARD $100**

**Notes:**
- Submit the Level 1 report (PDF format) to designchallenge@tsgc.utexas.edu by the deadline. Copy your team’s Faculty Advisor, Mentor, and any Collaborators.
- Photos are used for Showcase and other promotional materials and are needed by the Level 1 deadline to prepare printing.
- All submissions must meet the satisfaction of TSGC.
- If team earnings were paid with fall accrual, only optional funding may be added for spring.
The Level 2 milestone is the Midterm Report. Design concepts take shape for Semester I teams, customer (Mentor) needs are addressed, and a method of down-selection is implemented. Semester II teams are fine-tuning designs and constructing models or prototypes.

Note concerning Class Reports: Design Challenge requirements are not intended to cause students to duplicate work. Teams required by their instructor to submit a Midterm Report in a specific format may submit a copy of that report in lieu of the Design Challenge-style Report, as long as all necessary information is included or added. Contact TSGC with any questions.

### LEVEL 2 - RESPONSIBILITIES

#### SEMESTER I

- Submit a Midterm Report
  - Follow Writing Guidelines
  - Use quantifiable requirements/constraints to demonstrate customer needs
  - Profile concept variants
  - Illustrate method for determining concept feasibility/down-selection
  - Consider safety & risk factors
  - Incorporate visual elements to communicate concepts to reader
  - Adjust project timeline & budget plan
- Appendices:
  - Outreach report (if completed)
  - Budget Report
  - Team Trip Report (Field Experience)
  - Team Patch image with description
  - Pugh Chart/decision matrix
  - Others as needed
- Submit weekly Tuesday Tag-Ups

#### SEMESTER II

- Submit Midterm Report
  - Follow Writing Guidelines
  - Provide an update on project status
  - Discuss any issues and modifications
  - Address safety considerations
  - Report testing data and preliminary results
  - Estimate actual cost to develop for production
  - Adjust project timeline as needed
- Appendices:
  - Outreach report (if completed)
  - Budget Report
  - Team Trip Report (Field Experience)
  - Team Patch image with description
  - Pugh chart/decision matrix
  - Others as needed
- Submit weekly Tuesday-Tag-Ups

### LEVEL 2

- Send the Midterm Report / Midterm SOW (PDF format) to TSGC, Mentor, Faculty Advisor, and Collaborators
- Submit text for the Team Profile page
- Continue Tuesday Tag-Ups

#### DEADLINE

Friday, March 27, 2020

#### TEAM AWARD $200

Notes:
- Submit the Level 2 report (PDF) to designchallenge@tsgc.utexas.edu by the deadline. Copy your team’s Faculty Advisor, Mentor, and Collaborators.
- Team member background information (submit plain text only) is needed for the Team Profile Page. Review the example Team Profile page for suggested input (http://www.tsgc.utexas.edu/challenge/PDF/team_profile_page_examples.pdf).
- If team earnings were paid with fall accrual, only optional funding may be added for spring.
Level 3 marks the end of the semester: design-related activities come to a close, testing and data collection is completed, and conclusions are drawn. Final results are prepared and delivered via a poster/model display and oral presentation at the Design Challenge Showcase. Lastly, Showcase feedback is incorporated into the Level 3 Final Report and Video.

Note concerning Class Reports: Design Challenge requirements are not intended to cause students to duplicate work. Teams required by their instructor to submit a Final Report in a specific format may submit a copy of that report in lieu of the Design Challenge-style Report, as long as all necessary information is included or added. Contact TSGC with any questions.

**LEVEL 3 - RESPONSIBILITIES**

- Continue Tuesday Tag-Ups after Showcase until the final report is submitted (comment on the event)
- Finalize all design-related activity, prepare display and presentation for Showcase
- Participate in the Showcase:
  - Present a team-designed Poster/Model Display
  - Deliver an Oral Presentation as a team (all team members must speak)
- Complete the Final Report: Deliver electronic PDF report to TSGC, Mentor, Faculty Advisor and other Collaborators

Create a short video that promotes TSGC Design Challenge, your team and school, and your project. Maximum 3 minutes. Post anywhere publicly and permanently available. Here are some examples: [https://youtu.be/3Ci4XRXRDfU](https://youtu.be/3Ci4XRXRDfU)  [https://youtu.be/8boa-bG5CxBge](https://youtu.be/8boa-bG5CxBge)

**LEVEL 3**

- Showcase Participation: (a) Poster/Model display and (b) Oral Presentation
- Final Report (PDF format) to TSGC, Mentor, Faculty Advisor, Collaborators
- 3-minute video

**DEADLINES:**

Showcase Th-Fri, April 23-24  
Final Report & Video due  
Friday, May 8, 2020

**TEAM AWARD $700**

Notes:

- Participation in Showcase is mandatory for all team members unless there are unavoidable class or work conflicts. Please plan ahead to attend the entire Showcase from Thursday afternoon through Friday 5 PM. Please contact TSGC asap if any members have a conflict.
- The $700 Level 3 award includes built-in funding for travel expenses to Showcase.
- All Level 3 requirements must be completed to the satisfaction of TSGC as outlined above to qualify for team earnings (Money I - Earning) and awards (Scholarships).
- Registration for Showcase will occur approximately 3 weeks before the event. After all teams have confirmed registration, the oral presentation schedule will be finalized and a Showcase Registration Information Packet will be sent to all participants providing complete details of the event.
- If institution timelines/closures will prevent timely submission of team’s end-of-semester invoice, please contact TSGC as soon as possible to make other arrangements.
- If team earnings were paid with fall accrual, only optional funding may be added for spring.
Each NASA or contractor research group submitting a design topic to the Design Challenge agrees to provide a Mentor point-of-contact to work with the student design team. Once teams and projects are selected, TSGC notifies the Mentor that a team is forming and provides contact information to everyone involved.

**WHAT THE TEAM SHOULD KNOW ABOUT THE MENTOR:**

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<tr>
<td>- Think of the team’s Mentor as the design team’s customer.</td>
<td>- Mentors volunteer their time to work with Design Challenge teams, so remember that his/her regular job comes first.</td>
<td>- The Mentor offers the team a NASA-affiliated project that includes background info, technical specifications, and design parameters.</td>
<td>- Regular weekly updates via the Tuesday Tag-Ups.</td>
</tr>
<tr>
<td>- Work with your Mentor to establish design specification needs immediately upon forming the team.</td>
<td>- If Mentor availability becomes an issue, let TSGC know so that we can help find additional resources.</td>
<td>- Ask your Mentor to review the team’s <strong>Level 1</strong> (Proposal/Statement of Work) and <strong>Level 2</strong> (Midterm) Reports before submission.</td>
<td>- Copies of reports.</td>
</tr>
<tr>
<td>- The team’s Faculty Advisor is encouraged to contact the Mentor too, to ensure that the team’s plans align with expectations.</td>
<td></td>
<td>- Mentors typically make a best effort to attend Showcase</td>
<td>- The Mentor is not entitled to any items purchased by the team with TSGC funds (models, equipment, software or parts), although the team/department/institution may donate them.</td>
</tr>
<tr>
<td>- Run ideas by the Mentor to make sure the design is on track.</td>
<td></td>
<td>- Mentors generally let the team define the course of the project, while at the same time guiding the team toward the goal.</td>
<td>- If the Mentor agrees to loan the team equipment, parts, or samples, the expectations need to be clear – and the team responsible – in ensuring their return at the end of the project.</td>
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TEAM EARNINGS FOR COMPLETING MILESTONES

<table>
<thead>
<tr>
<th>Level 1 (Proposal)</th>
<th>$100</th>
<th>Report, team &amp; individual photos, and patch</th>
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</thead>
<tbody>
<tr>
<td>Level 2 (Midterm)</td>
<td>$200</td>
<td>Report and team profile page</td>
</tr>
<tr>
<td>Level 3 (Final)</td>
<td>$700</td>
<td>Showcase participation and report &amp; video</td>
</tr>
<tr>
<td>Outreach</td>
<td>$200</td>
<td>Report and photos</td>
</tr>
</tbody>
</table>

SCHOLARSHIP OPPORTUNITIES for TEAM PERFORMANCE

| Top Design Teams | $TBD | Achievement-based awards for each member of the top teams in the form of scholarships. |

SUPPLEMENTAL FUNDS

| Special Construction or Travel Grants | $TBD | Amount depends on TSGC resource level each semester. If your travel expenses are excessively large or your anticipated prototype construction budget exceeds your anticipated team earnings, contact TSGC to see if supplemental special funding is available. |

Notes:

- **TSGC does not reimburse teams directly.** TSGC pays your department the team earnings after they have been earned and invoiced, then your department reimburses the team.
- The team may plan a reasonable budget of $1000 for the semester based upon successfully completing the three milestones (or $1200 if also completing Outreach). Note that your department will reimburse your Showcase travel expenses from this amount. A good estimate of the hotel group rate is $120 per room. Your department accounting office can help with estimating mileage and other costs.
- Ask your Faculty Advisor if the department may be able to advance funds until the team funds transfer from TSGC to your department. Team members are cautioned against using their own money to pay for project expenses. Understand that university paperwork may move slowly – reimbursement may take longer than your budget can spare.
- Your institution accountant has no idea how much money the team has earned – or what a Level award is – but does know how to get the money to pay for your project. Work closely with this person to establish a team account and budget.
- **If team earnings were paid with fall accrual, only optional funding may be added for spring.**
Where does the money come from? The funding supporting the program is delivered from NASA to TSGC. The official term for this is a federal pass-through grant. TSGC delivers the money that your team earns to your department by way of an Award Agreement between TSGC (located at the University of Texas at Austin) and the institution.

How does the money get to the team’s institution? At the beginning of the semester, TSGC will send the Design Challenge acceptance letter to your team’s Faculty Advisor, who will pass it on to your department accountant. This letter provides assurance that TSGC will pay your department for any money it spends to support the team up to the milestone award levels that the team earns. In most cases, this letter paves the way for the Faculty Advisor to set up a team account.

Tips:
- Save receipts to be reimbursed by your department. TSGC requires a single invoice from your department with team earnings, not expenditures.
- Get to know your department accountant who is responsible for processing your travel paperwork and managing the team account.
- Budget carefully. TSGC is not responsible for covering team over-expenditure.
- Avoid paying unnecessary taxes. Universities are exempt from paying certain kinds of sales or hotel taxes. Talk to your department accountant about what supplies and travel costs are tax exempt. TSGC will include a tax-exempt form in your packet for the Showcase hotel.

Funding note: any federal budget delay or government shutdown will impact TSGC funding and could impact timeliness, availability and amount of team earnings and scholarships. Federal funding is not guaranteed.
How do Team Earnings work?

Project/Travel Funds: At the end of the semester, TSGC sends the Team and Faculty Advisor a letter telling the team how much it has earned. To retrieve the earnings, TSGC must receive a signed invoice from your institution from the team Faculty Advisor, department accountant, or university contracts contact. A sample invoice will be emailed to the team at the end of the semester, or contact designchallenge@tsgc.utexas.edu for a copy. The invoice may be submitted as funds are earned at each level or saved until the end of the semester when a total award amount is determined.

Rules of use: NASA is a federal agency; therefore, some restrictions exist on how team money may be spent or distributed. For example, the following expenditures are generally considered allowable:

- Reference materials
- Software
- Team travel
- Equipment rental
- Display materials
- Meeting expenses
- Postage
- Model materials
- Registration fees

And these expenditures are not allowable:

- Non-project travel
- Alcohol
- Regular meals
- Activity fees
- Entertainment
- Personal use

All funds received from TSGC from milestone earnings must be used for the direct purpose of addressing the Design Challenge topic. Funds remaining at the completion of the team’s participation will remain with the Faculty Advisor and may be spent at his/her discretion.

How do Scholarship Funds work?

If your team earns scholarship awards at Showcase, each team member must submit a “Scholarship Forms Packet” to TSGC before dollars can be distributed. This packet will be sent to applicable teams and provides TSGC with information necessary for the disbursement of scholarship funds. This money is delivered via a separate TSGC account directly to the students and there are no restrictions on the use of scholarship funds.

Notes:

- Your Faculty Advisor or department accountant has knowledge of what type of spending is considered eligible for reimbursement. Always check your institution’s rules for reimbursement before spending.
- Funds from TSGC are for the sole use of the team members and Faculty Advisor.
FREQUENTLY ASKED QUESTIONS ABOUT TEAM SPENDING

Q. We’ve finished and are under budget. How can leftover funds be used?
A. Any team earnings remaining at the end of either semester may be used at the discretion of the Faculty Advisor. Here are some examples of how faculty have put surplus earnings to good use:

- For next semester’s team expenses or for next year’s Design Challenge team
- End of semester team celebration
- Distributing leftover funds as scholarships to the team members
- Display case for use by the department to house student projects and awards
- Software, hardware, books, or lab equipment for classroom use

Policies vary by institution, so don’t assume that because one institution spent funds in a particular way that your institution will allow the same thing. Check with your department first.

Q. I need to purchase a (suit / haircut / car tires / etc.) for Showcase. Is that allowed?
No. Only project-related expenses are allowed from team earnings. Your department may help the team secure a rental car and this can be charged to team funds. (However, any scholarships that the team members may be awarded after Showcase are unrestricted in their use.)

Q. Why do we have to use our own credit cards to pay for our Showcase expenses?
A. Typically when on university travel, expenses are paid with a personal credit card and reimbursement is received later after submission of a travel expense form and receipts to your department. Do not submit receipts to TSGC. TSGC is able to set up the group rate at the hotel but cannot directly pay or reimburse for the rooms. Contact your Faculty Advisor to see if your department can book the rooms for your team or provide a cash advance.

Q. What happens if we go over budget?
A. The consequences are up to your department. If you paid for any expenses out of pocket, you may not be able to get reimbursed. Only your department can reimburse you for team expenses, TSGC cannot. Check with your Faculty Advisor before spending any funds.

Have other money questions? Contact designchallenge@tsgc.utexas.edu
Participation in outreach activities is highly encouraged by NASA as a way to spread excitement about Science, Technology, Engineering and Mathematics (STEM) to the community at large. Outreach offers each team the opportunity to get involved and, at the same time, earn additional project funding. Outreach activities may be conducted with K-16 classrooms, youth groups, STEM clubs, museums or public STEM events.

OUTREACH GUIDELINES

- Present, demonstrate, or display any STEM-related activity with an audience.
- Incorporate outreach at any time during the semester (or between semesters for two-semester teams)
- Award available once per semester
- Document the activity in a report, or as an appendix to your team’s Level 2 (Midterm) or Level 3 (Final) Report
- Report guidelines:
  - 500 words minimum, 1 or more photos of the team conducting the activity
  - Write a description of the activity presented
  - Include the type and name of the event and location
  - List audience type, level/grade, and number (provide an estimated head count). This is necessary for NASA outreach reporting guidelines.
  - Describe what the team learned though this outreach, what questions or feedback the team received, and what impact the team believes they made

OUTREACH

- Outreach Report including photos and full documentation

FINAL DEADLINE:
Available at any time while the team is active, once per semester

TEAM AWARD $200
In the spirit of NASA tradition, Design Challenge teams are required to submit a team-created patch for their Level 1 report. Have some fun and call on your creative side to design a patch that represents the team and its mission. If no one on your team is graphically inclined, try collaborating with someone outside the team who is.

Since Gemini 5 in 1965, each crew assigned to a NASA space flight mission has designed its own mission patch. Included in the patch design are various elements that represent the crew, the mission, the mission number, and the fact that they are all “in this together.” The original TSGC Design Challenge mission patch was designed during the program’s first official semester of operation in Spring 2003. Each semester since, the original design has been updated so that each semester’s program patch is unique.

**TEAM PATCH DESIGN SPECIFICATIONS**

| Drawing | • Use any program: vector-based (line art/drawing) or a raster or bit-mapped (photograph-like images)  
|         | • Hand drawn is fine too. Draw large to scan at high resolution.  
|         | • The design may be simple or detailed.  
| Size and shape | • The patch can be any shape  
|         | • The patch may be constructed at any size, but remember that the final size is meant to be about 4 inches width and height.  
| Delivery | • Send the patch to TSGC as a separate high-res attachment.  
|         | • Include the patch image and description in the Level 1 Report.  
| Format | • EPS format preferred. JPG and TIFF are acceptable.  
|         | • High resolution: 300 dpi or higher  
|         | • Colors should be formatted as RGB or CMYK.  

A few samples of team patches are below. More may be found on the TSGC website.
Scholarship Awards for Exceptional Performance

The Design Challenge Showcase near NASA’s Johnson Space Center in Houston is the culmination of the project and offers teams the opportunity to present their projects to NASA personnel and academic and industry partners.

This event also provides TSGC the opportunity to reward team accomplishments in a variety of areas. Because a “Top team” showing requires exceptional work, these awards make up the competitive component of program participation. Showcase awards are provided directly to team members as scholarships and are therefore not restricted in manner of use. Award amounts may vary significantly each semester and are limited by the level of TSGC scholarship funding available.

The highest award is for the Top Design Team, based on the sum of team achievements throughout the semester and at Showcase. What criteria determine the Top Design Team? Most importantly is the team’s placement in poster, model and oral presentation judging categories during Showcase. Other factors may include design characteristics, administrative details (meeting deadlines), reviewer feedback, design innovation, and overall success of the project.

How do Scholarship Funds work? If your team earns scholarship awards at Showcase, each team member must submit a “Scholarship Forms Packet” to TSGC before money may be distributed. This packet will be sent to applicable teams and provides TSGC with information necessary for the disbursement of scholarship funds. There are no restrictions on the use of scholarship award funds.
Design Challenge Showcase at South Shore Harbour Resort & Conference Center, League City, TX, April 23-24, 2020

Poster Presentations Thursday, April 23, afternoon
Oral Presentations Friday, April 24, all day

The Showcase provides teams with a formal venue where they can display and discuss their design efforts and accomplishments. The event kicks off with a poster session Sunday late afternoon.

**Audience:**
Teams can expect an audience of 100-150 people that includes the NASA JSC community, academic and industry partners, TSGC representatives, educators and other invited guests, other student teams and their Faculty Advisors and Mentors.

**Awards:**
Team recognition and achievement awards (Scholarships) are presented at the conclusion of the Showcase. Several audience members act as judges for the poster, model and oral presentations. Teams also score each other in the poster/model category. Judges’ scores are normalized, high and low scores for each team are dropped, and the average team score is used to determine team rankings for each award category.

Two methods are used to convey the team’s work to the Showcase audience:

- **Poster/Model presentation and table display:** Guests walk around to view the displays and talk informally with the teams Wednesday and during scheduled breaks between talks on Thursday.

- **Oral presentation:** Formal team presentations on Thursday. A short question & answer session follows each team’s talk.

**General Guidelines:**

- Attendance is required. We ask that all team members remain present throughout the Showcase. Contact TSGC ahead of time if any team member has a schedule conflict.
- Faculty Advisors and Mentors will be invited by TSGC.
- Guests are welcome and guest tickets will be available for pre-purchase only during the Showcase registration process. Teams may invite partners, family, friends, Collaborators and other colleagues.
- On Thursday late afternoon appetizers and on Friday a continental breakfast and luncheon are served. The Showcase registration forms will include a place to specify dietary restrictions.
- Attire is business casual.
Poster Presentation and Table Display:
Each team’s poster display will profile the design project with textual and visual information. Easels and tables are supplied. Models or prototypes are strongly encouraged. Teams may display illustrations, photos, charts, samples, laptop, scrapbook, etc.

Oral Presentation:
- Slides are loaded onto the computer on Wednesday or during break times on Thursday.
- Teams may use available TSGC laptops (Mac or Windows) or bring their own.
- Teams are allowed 12 minutes for their talk. Plan on 10 minutes for the team plus 2 minutes for Q&A afterwards.
- Speaking roles should rotate through all team members.
- Schedule: The total number of teams participating this semester will impact the presentation schedule. More details with set times will be provided after Showcase registration, approximately 3 weeks before the event.

Presentation Tips:
- Keep slide content simple and easy for the audience to read.
- Bullet the main points to be addressed.
- Try to limit each slide to 5-6 bullets, and each bullet to 8-10 words.
- Use plenty of visuals (photos, graphs, drawings) to enhance ideas presented.
- Allow time to cover background material. Most of the audience is new to your topic.
- Text should be large enough for the audience to read, about 24-point font (30 or larger for titles, no smaller than 20 for sub-bulleted information).
- Consider the effect of color and layout on the audience.
- Dark background with a light text shows up best in meeting rooms.
- Speakers should not read from the slides but should use the bullet points to recall details and descriptions of the topic being presented.
- Avoid slides with too much information. If the material is necessary to show on the screen, use two sides instead of crowding information onto one.
- Estimate that initially your team’s presentation will run long and practice until you can deliver it within the time limit.
- Practice. Practice. Practice.
Finding the right student members to comprise the design team can be a very challenging aspect of the program. Sometimes the team members are assigned to work together by the course instructor, other teams are self-selected. However the student teams are put together, they are a group of individuals who may not be used to working closely alongside others. Learning to draw upon each team member’s strengths while maintaining good group dynamics is critical to team success.

NASA has strong history of putting successful teams together to accomplish a monumental goal. Experts in team organization offer the following tips on getting a student design team off to a good start.

Get Acquainted. Make an effort to get to know each other and learn what each team member brings to the table. Meet outside class to watch a space-themed movie like Apollo 13, Gravity, or The Martian. Discuss the teamwork that was necessary to reach a successful conclusion.

Establish Group Goals. Sometimes the “big picture” can overwhelm less experienced team members. Use Design Challenge milestones to help the team set incremental goals.

Strike an Expectation Agreement. The team, as a group, will not be successful if team members don’t agree on what is to be expected from individuals and the group as a whole. It works best if expectations are established early:

- What is expected from each team member?
- What level of participation is required from each member to guarantee success?
- How do you identify and what happens if expectations are not met?

Establish Roles for individual team members and set expectations for each:

- Read through the list of milestones to see if specific requirements suit the talents of someone on the team.
- After a Team Leader is identified, assign others to track the budget, take photos, proofread, program, contact Collaborators, plan the Field Experience, Outreach, etc.

Be organized. Although each team designates a Team Leader, a single person cannot get the team through successful project completion alone. Every person in the group will need to devote substantial time and effort to the project.

Communicate. Make sure everyone knows what’s going on with the team and the design. The team leader is usually the primary contact between the team members and with TSGC, Faculty Advisor, Mentor and others. An alternate member or a “Communication Officer” may serve instead or as a back up.

Address Problems Early. Keep your Faculty Advisor informed of any team problems, and keep your Mentor informed of any technical issues. Plan a strategy for addressing problems to keep them from impacting the team’s long-term design effort.
# DEADLINES

## TUESDAY TAG-UPS

| Due Weekly | Due every Tuesday from the date of Team acceptance through the Final Report submission. See Tuesday Tag-Ups for details. | No team funding, but performance will contribute to success |

## MILESTONES

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<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
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<tbody>
<tr>
<td>Application</td>
<td>Photos/Patch</td>
<td>Midterm</td>
</tr>
<tr>
<td><strong>Deadline:</strong> Tuesday 1/28 (returning teams), Friday 1/31 (new teams)</td>
<td>Due Friday, February 21, 2020</td>
<td>Due Friday, March 27, 2020</td>
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## OUTREACH

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<td>No specific deadline. May be accomplished at any time during the semester while the project is active, or between semesters if a two-semester team.</td>
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## OTHER

| Special Construction or Travel Grants | No specific deadline. Supplemental funds for special circumstances | Contact TSGC to check if supplemental special funding may be available. Amount depends on TSGC resource level each semester. |
The weekly Tuesday Tag-Up will be used as a means for the Team Leader or communication person to brief your Faculty Advisor, Mentor, TSGC, and any necessary Collaborators on the design team’s weekly progress.

- Reports are emailed every Tuesday (as you might expect), starting from the date the team’s Design Brief application is accepted until the team’s Final Report has been submitted.
- If one single requirement is going to keep the team on track this semester, it will be this weekly briefing. Although the repetition of this requirement may become tedious, it is regarded as one of the best tools NASA has for maintaining communication and assuring everyone involved with the project that progress is being made.
- In the report, the Team Leader should provide an update on accomplishments, budget updates, bring up any issues or concerns, and report the plan for the next week. The Tuesday Tag-Up lets the Faculty Advisor, Mentor and TSGC know how the team is working, and it lets the team know that we are listening.

Example:

From: Student Team Leader or Communication Officer  
To: TSGC <designchallenge@csr.utexas.edu>, Faculty Advisor, NASA Mentor, Collaborators  
CC: All Team members  
Subject: Space Blasters – Tag Up – Week #3  
---  
Team: Space Blasters  
Institution: University of Texas at Austin  
Topic Title: Effects of Barbeque Deprivation on ISS Crews  

Although this week started off rather slow, it ended on a good note…

Overall project status: How is the project going? Is everything on target?  
Activities this week: What has the team been doing this week? Any meetings?  
Problems encountered: Any surprises thus far?  
Approximate number of person-hours spent on design activity this week:  
How much time did the team devote to the project this week?  
This week’s budget items: Any expenses incurred?  
Activities planned for next week: What do you have planned for next week?  
Additional comments: Anything else you want to mention?
Writing Guidelines for Design Challenge Reports

Each milestone requires the submission of a formal report. Guidelines to help teams address these requirements are presented below. **Please submit all reports in Adobe PDF format.**

**Note concerning Class Reports:** Design Challenge requirements are not intended to cause students to duplicate work. Teams required by their instructor to submit a Midterm or Final Report in a specific format may submit a copy of that report in lieu of the Design Challenge-style Report, as long as all necessary information is included or added. Contact TSGC if you have questions.

| General | - Double-spaced, 1” margins, minimum 12 point font  
|         | - No page limits, however extensive collections of data, tables, photos, or graphics should be placed in Appendices at the end of the report.  
|         | - Avoid writing in first person  
|         | - Check grammar and spelling. Double check. Triple check.  
|         | - Email PDF copies to TSGC, Faculty Advisor, Mentor, and Collaborators

| Introductory Material | - Include cover page with the project title and most important information  
|                      | - Be thorough when providing information about the team members, Faculty Advisor, Mentor, and Collaborators  
|                      | - Include a one-paragraph summary or abstract  
|                      | - Include a table of contents, list of figures and tables where necessary

| Research | Discuss specific resources you have used to conduct research.  

| Background | Explain where the project originated and what it is about.  

| Objective | Describe project goal/objective, including continuation of previous efforts.  

| Design Plan | Detail the teams plan or methods for meeting the design objective.  

| Accomplishments | Chronicle the key accomplishments that the team has experienced to date.  

| Timetable | Provide a timetable for completion of the project.  

| Budget | Provide a table showing the team’s budget plan. Include projected and actual earnings and expenditures associated with the project.  

| Conclusion | Sum up. Include future project plans and potential applications.  

| References/Bibliography | Include a reference list. Academic standards regarding original work apply.  

| Appendices | Field Experience, Outreach report, data, code, graphics, etc.  