1) Select a tire size.

2) Obtain realistic performance goals & weight targets(http://www.fsae.com is a good resource for data. Search first!).

3) Design suspension.

4) Postion necessary components (DRIVER!/engine/diff/pedals/etc)

5) Connect the dots.

-Don't forget to 'manage' the static & dynamic loads imposed by the components.

-Free body diagrams (FBD's) are Your best friends.

-Bending loads are the devil's way of getting back at engineers for creating air conditioning.

-If You want to get fancy, figure out each part's deflection given the FBD. Use this accumulative deflection to see what it does to Your suspension geometry. Adapt as you see fit.

You may want to consider whether Your program wants to make it a car building exercise, or an engineering exercise (coincidentally designing a car). Access to resources (equipment/ manpower/ raw materials) usually determines this for You. There are justifiable arguments for both paths.

My preferred method for system design (when time & resources permit) is to design for ultimate performance at the risk of reliability, then use FMEA to determine exactly where needs to be fortified or reiterated. The reverse can also be successful - design with ultimate reliability as primary and loss of performance as the risk, then reiterate to improve performance using analysis (FMEA can be used since extreme lack of performance is a "failure mode" of a race car...). Most FSAE teams choose the latter but often lack the scientific approach of what to improve.

First car, if you don't have the resources I think you'll be much better off following the KISS principle and build something that runs. It'll be as much of an exercise in car building as organization building. IMO if a first year car can finish and score in all the events then regardless where you finish its a win in itself. Its so easy, even for an established team, to overthink and take on way too more than it can manage. Personally I think you can do a lot of thinking but without actually put your hands on something you can't tell where your practical limit is.

Estimate a cornering force, set a target way, FBD your way up from the tires to get the loads, and set a relatively generous safety factor to start so you don't end up breaking --- all the time. Use a lot of jigs when you make things so you make them right, and once the car is done drive the crap out of it...keep a binder to document anything you learn along the way, and when its time to put the next car, try to keep all that in mind....

I think it'll be impractical unless you really have access to alot of resources and know-how, to design a ultimate performing car as a target. Its been done more recent years though with the lot of the European schools, but I know at least in the environments I've experienced it's impossible to do...

If you're a rookie team (this is my assumption for this entire post) or you're completely new to this, I wouldn't be thinking about a composite chassis. If you intend to compete, you need to get a car built, period. Having participated with a rookie team myself, I understand the temptation to think you can show up and blow everyone out of the water. I don't mean to be negative, but you aren't going to win the competition the first year, and that shouldn't be considered a realistic goal. The goal of your design should be absolute reliability. If you have a car that doesn't break down and finishes endurance, which is easier said than done, then you'll be one of the best rookie teams ever. Seriously...

With regards to your questions about chassis design, you've more or less answered them yourself. When you break a car down to its simplest level, the chassis is really nothing more than a huge mounting bracket. There are certain components that have to go in a specific location (give or take a few inches): the driver, engine, drivetrain, suspension pickup points, etc. Working concurrently with the suspension design, you can get an idea for where these components should go, and as mentioned before, you just connect the dots from there. The trick is knowing which dots to connect.

Setting up the load scenario based on inertial and tire forces to see what you're deflection is would be a worthwhile engineering exercise, but don't get too caught up in the minute details trying to decrease deflection by small percentage points. If you see that making a certain change will drastically improve the deflection, then make the change. Otherwise, you're best to just call it 'good enough' and move on with the build. Pluck the low hanging fruit first... As a younger team, if you show up and tell the design judges that you have a deflection/load of XX units/units and you started with a deflection/load of some other number, and that you decided to freeze the iterations because you didn't see any worthwhile gain based on your goal of getting a reliable car built, then they won't think less of you. In fact, they'd like to see that.

I'm assuming you've visited FSAE.com and read through some of the forums already, but if you haven't this thread is a fantastic starting point: Reasoning your way through the FSAE design process

You're right in that a good chassis makes for a good starting point. But do not underestimate the task of getting the car done. You can iterate for months on the chassis/suspension design and improve incrementally the whole time. However, if you don't get the car done, it would be a fruitless exercise. And the "law of pi" definitely applies when it comes to building a car from scratch. In other words, estimate how long it should take to do something, and then multiply that by pi, and you then have a more realistic estimate.

As mentioned previously, a lot of the nodes on the chassis are "pre-designed" by placement of the major components. Additionally, many of the tube cross-sections are specified in the rules, so there is not a whole lot left for optimization, other than how you "connect the dots." If you have access to some form of FEA software that can run 3D beam elements, you can get a rough idea for the deflection fairly quickly. I would come up with a couple chassis concepts with regards to how tubes are routed then determine how much each concept flexes for a given loading scenario. You may even consider simulating the front and rear separately by fixing the main roll hoop. Once you've tested a couple broad concepts you should be able to get an idea for which tubes are efficiently helping the rigidity, and which tubes are just there and can be omitted or made smaller. I would only run a couple iterations once you have determined that everything will fit in the car and all the required templates will pass. At that point, freeze the design and move on. For a first year car, taking 10 pounds out of the chassis is without a doubt not as beneficial as finishing the car a week or two earlier.

If you explain to the judges that you're a first year team, and you're design is not as refined because of it they won't frown upon that. If you can show throughout your design how you've erred on the side of reliability (without going overboard), they will certainly understand and respond favorably. The important thing to demonstrate is that you understand the load paths experienced by the car. That is, you understand how the suspension forces are reacted in to the chassis, or how effectively is your differential mounted with respect to handling torque, and especially that you don't have bolts or rod ends in bending... In short, demonstrate that you understand the very basics of how to put things together. If you can't get that stuff right, then no amount of trick engineering with some fancy suspension or engine setup is worth anything because the car just falls apart. Unfortunately, and understandably, most students don't appreciate this fact when they start projects like FSAE.

Oh, and having a wheel fly off is not only embarrassing, it can also be dangerous. We had that happen to our first car during testing for our second car and we were lucky no one got hurt. Ironically, I was probably in the safest position because I was strapped in the car...